THE Chemical Age

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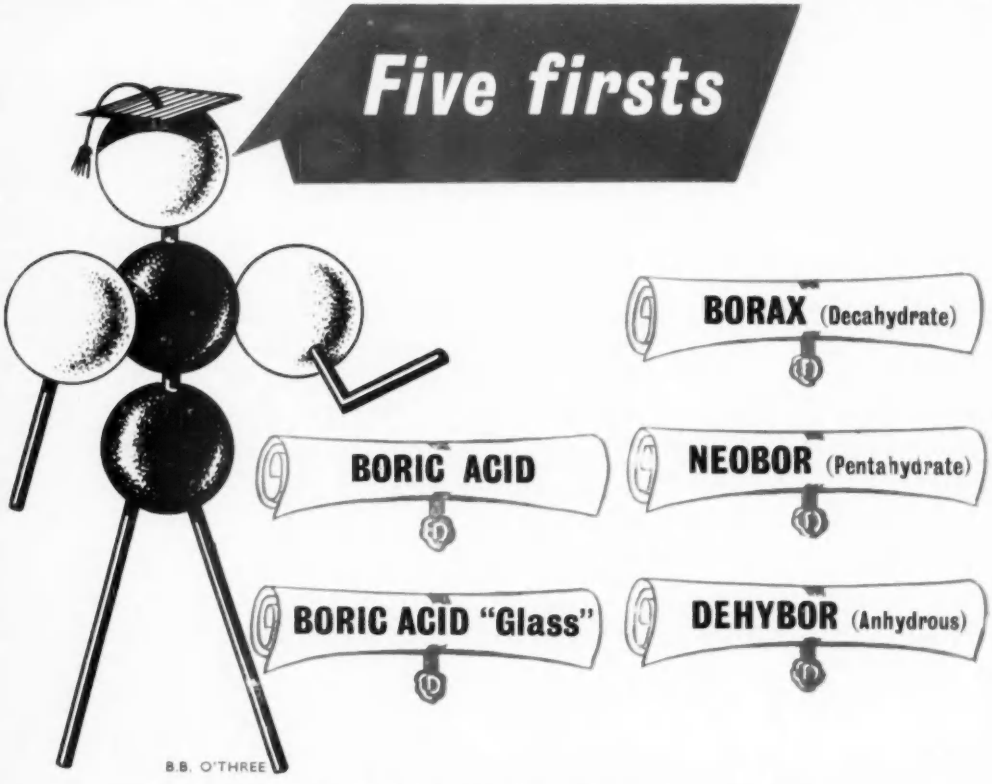

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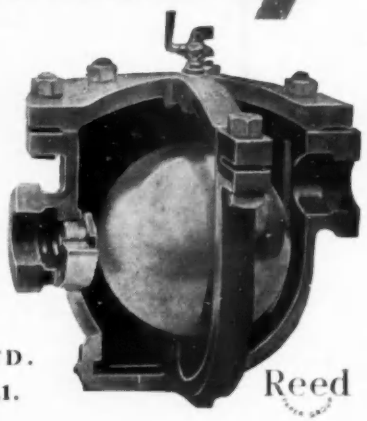

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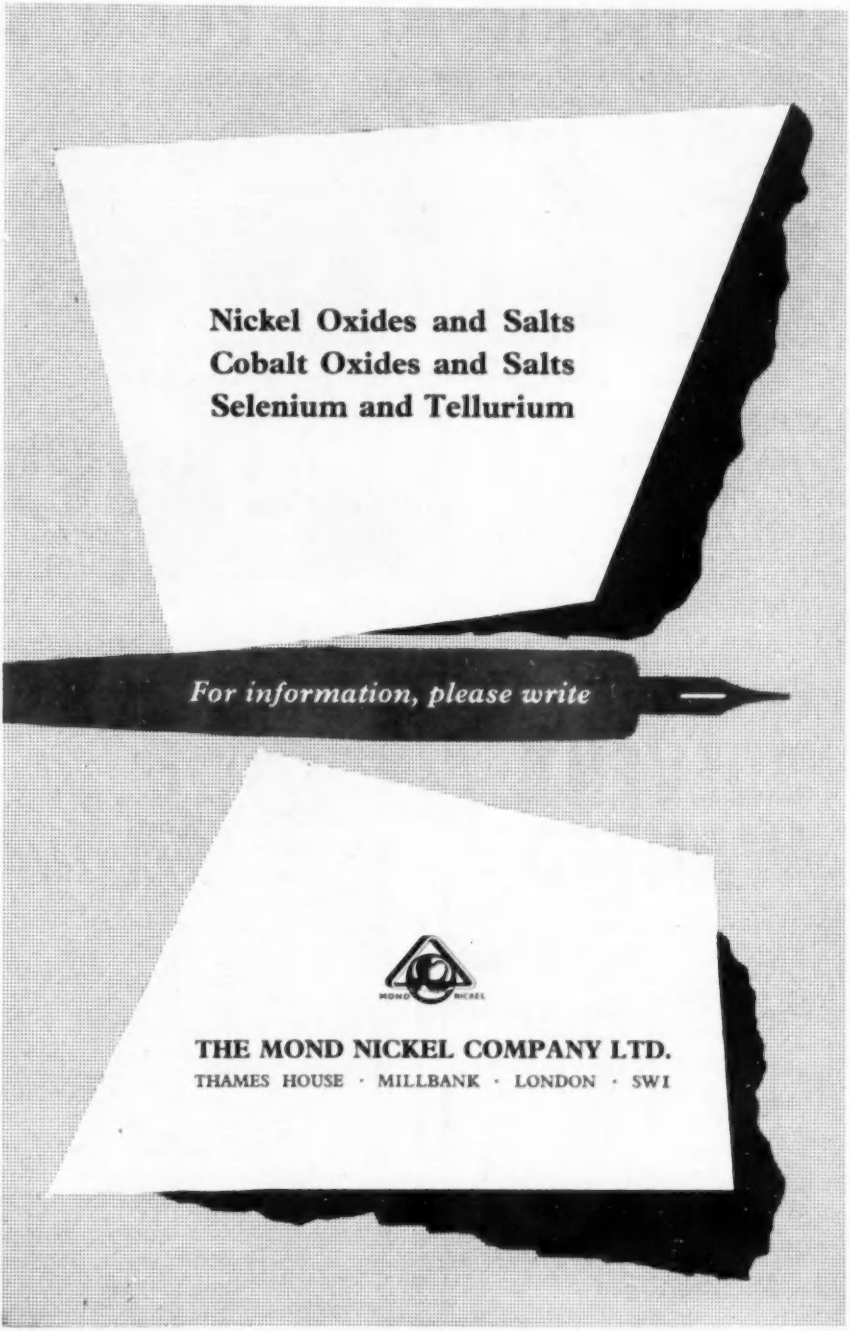
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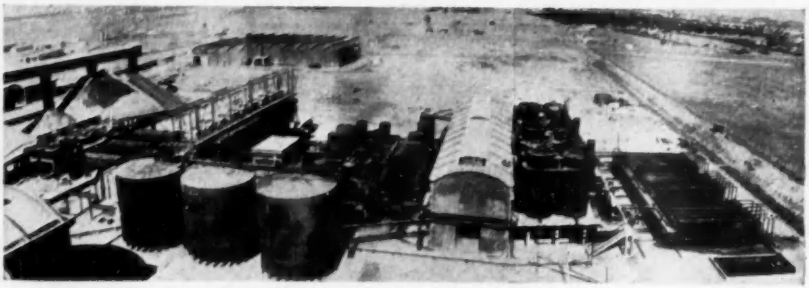

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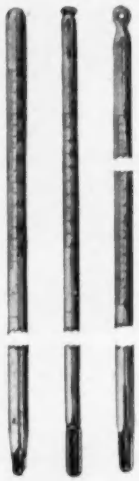

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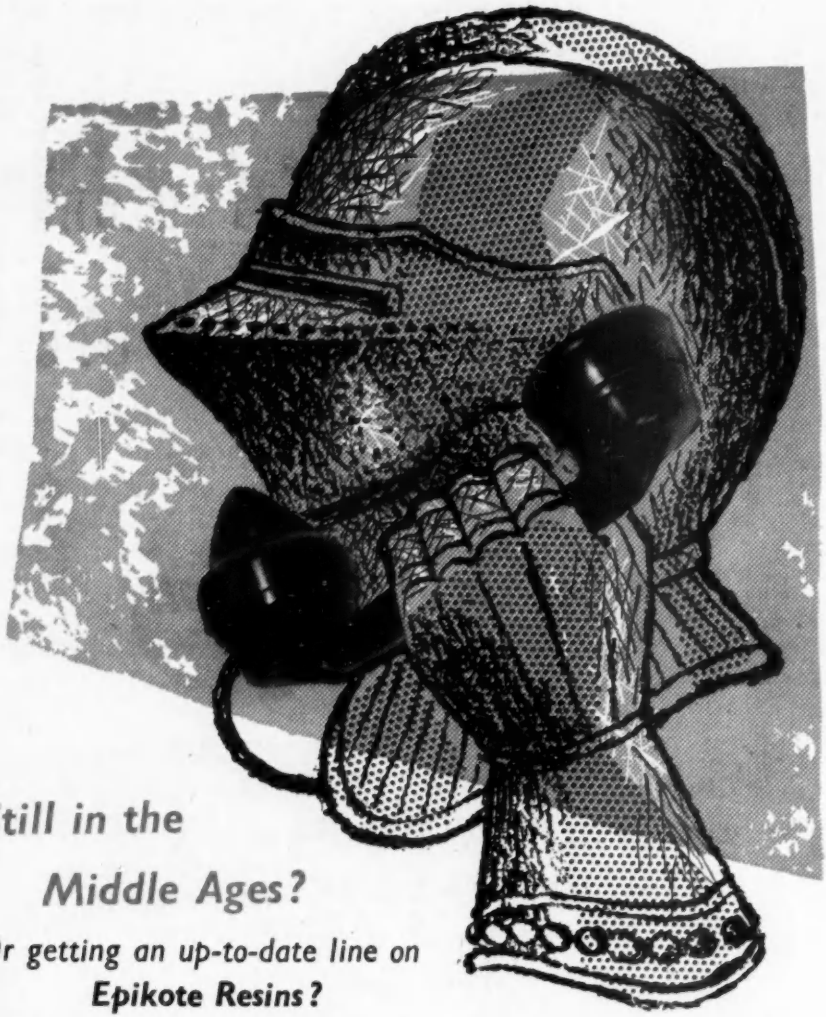

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CONTENTS . 16 JUNE 1956

Warner-Lambert Pharmaceutical Group Developments	1313
Chlorine & Fluorine Hazards	1315
Electrochemical Research in India—1955	1317
Personal	1320
German Chemical Imports Up	1321
Italian Chemical Industry	1322
Titanium Safety Standards	1323
Water Pollution	1325
Open Day at Harwell	1328
Coal & Chemical Engineering	1329
Overseas News Items	1330
Publications & Announcements	1331
Home News Items	1332
The Chemist's Bookshelf	1333
Next Week's Events	1336
Chemical Research in 1955	1338
Law & Company News	1339
Market Reports	1340

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CRL Report for 1955

LEADER theme is again a DSIR subject. Why? Because during last week the *1955 Report of the Chemical Research Laboratory* was published by HMSO at 4s. Even in the cause of variety this report could not have been ignored. As is now well enough known, the programme of CRL is far from all-embracing. Rather it has become a highly selective programme, concentrating effort upon defined areas—corrosion of metals, radiochemicals, high polymers, microbiology and, more general in sound, organic and inorganic chemicals. However, even the latter groups have their own selective programmes. Only in this way could a staff of 196 make contributions to the ever-widening front of modern chemistry. The 1955 report completely justifies this policy. For a single year a notable number of advances have been achieved.

There are, however, two signs of departure from balance, and attention seems to be given to only one of them. Many outside requests for advice and information are received by CRL, and often the testing or investigations required involve subjects or techniques which are no longer of research interest. Such work, therefore, would be of little mutual value to CRL and the enquiring firm. On corrosion problems alone the 1955 enquiries numbered 400 compared with 240 in 1954! Routine testing is not the function of CRL nor, obviously, could it become so without a substantial increase in staff and accommodation. It is now the declared policy of CRL to refer such requests to private consultants through the Royal Institute of Chemistry. It is stated, however, that exceptions are made for requests from other DSIR organizations or Government departments.

The other unbalancing influence which would appear to be giving CRL much less concern is the predominance of work done for the UK Atomic Energy Authority—'the volume has now so increased that during the past year authority was given for 10 new staff to be recruited, thus making the staff of the Radiochemical Group approximately a quarter of that of the entire Laboratory.' The main subjects studied for AEA are extracting and concentrating valuable metals from ores and minerals. No one would question whether this work should be done; the only criticism that can be levelled concerns the unilateral expansion that one section of CRL enjoys in consequence. It seems odd, for example, that fundamental work on high polymers should have a group scientific staff of 14 compared with 30 for the radiochemical group.

Still, there are 'non-atomic' by-products from radiochemical research, and the 1955 report provides an important example of this. A new process for gold and silver recovery has been developed by the radiochemical group. Certain weak base ion-exchange resins selectively adsorb these elements from normal gold mill liquors. The adsorbed elements are then easily eluted by relatively cheap reagents (e.g., ammonium thiocyanate) and can be recovered by low e.m.f. electrolysis from the solutions thus obtained. A feasible process must wait upon further research and development studies, but already the gold producing industry is considerably interested. Undoubtedly also, the demands of atomic energy research have led to

new techniques and extensions of techniques in analytical chemistry. Thus, the report reveals that paper chromatography has been extended by using cellulose in which hydroxyl groups attached to glucose residues are chemically combined with acidic or basic groups. Phosphorylated cellulose has been produced with good stability and adsorptive power. This can adsorb large amounts of certain metals from very acid solutions, conditions under which ion-exchange resins would be useless. Other modified celluloses are being studied. But even these windfalls from specialized investigation cannot entirely dissipate the disquieting thought that more and more effort of CRL is being determined by atomic energy project needs. The group-staff comparison given above does not tell the whole story. The programme of the inorganic group has also been influenced by atomic energy requests with a resultant increase in attention to rare earth elements separation and purification.

No doubt in an ideally organized world none of this would matter, but government research centres, however vital their work, are still government departments. If in the present period almost all the expansion of CRL is expansion for atomic energy purposes—and this seems dangerously close to the fact—the other work can suffer indirectly. Other expansions may be postponed, or refused, by an economy-committed administration, and it would be a sound enough answer to most critics to point out that CRL efforts 'as a whole' had already been allowed to increase by 'X' per cent. The fact that the 'X' per cent is entirely an expansion for one purpose would not be obviously apparent. The truth of the matter is that the chemical work required for atomic energy developments is being done and financed 'on the cheap'. It should have been separately organized as an integral part of the atomic energy programme, and costed as part of the essential national investment in atomic science. As things now stand, much of this chemical work has been done by CRL; it has, seemingly, absorbed much of the promised post-war expansion of CRL effort.

It is interesting to see how much, or how little, other CRL activities have expanded. Assuming that staff numbers are a rough guide to this, we find that in 1950 (see the report for that year) the staff of the High Polymers Group was 12 compared with 14 for 1955. The Corrosion of Metals Group, 1950, was staffed with 12 compared with nine in 1955. Organic Group, 1950—staff of 20; 1955, staff of 24. Only the Microbiology Group has a better story to show—1950, staff of seven; 1955, staff of 16. However, in 1950 this last section had just commenced separate existence. These figures appear to confirm the general conclusion reached in the preceding paragraph.

Even so, the contents of the report hardly give a non-expansive picture. It may be a reasonable reply to these criticisms of policy that the pudding supplies its proof in the eating, but whether this can always be maintained remains a matter of argument. In our view, fundamental research work on microbiology, on remedies for corrosion, on high polymers—to cite only three selected fields of CRL interest—must be conducted more expansively if the risk of missed opportunities is to be kept as low as possible. These are expansive fields of research—in two of them major processes of the industrial future are to be found, in the third there are great opportunities for reducing national wastes and loss. Indeed, the most powerful argument of all may well be that the excellence of the 1955 CRL report proves that greater effort would fully justify its cost, and that expansion should not be dominated by atomic energy's chemical problems.

Notes & Comments

Fertilizers in Europe

THE new OEEC *Report on Fertilizers (1953-56)* (HMSO, 8s) confirms our recent comments on this subject about UK consumption (THE CHEMICAL AGE, 1956 [74], 1165). The 1954-55 year overall increases for nitrogen, phosphates, and potash were 7, 3, and 4 per cent respectively. But for the UK the figures showed 3 per cent rise for nitrogen, 12 per cent *fall* for phosphates, and 0.5 per cent rise for potash. Although this can be attributed considerably to the effects of bad weather in the 1954 autumn, this adverse influence is referred to in the report as one affecting most member-countries. The truth is that the expansive trend here is not as robust as in several other countries so that any check to it must have more damaging effects. For a typical comparison take the case of Germany as described in the report: 'In spite of bad weather conditions in 1954-55, the consumption of fertilizers continued to rise and was 2.5 per cent higher for nitrogen, 3.5 per cent higher for potash, and 13.5 per cent higher for phosphate fertilizers than in the previous year. . . . *No subsidies were paid*, but reduced freight charges were granted . . . .' It is not because fertilizers cost less in other countries that the rate of expansion in use is higher. OEEC figures for prices, taking 1949-50 as the basic index of 100, are as set out in the following table (four Continental countries and the UK):

	nitrogen	phosphates	potash
Belgium	105	100	78
Denmark	102	120	81
Germany	121	164	130
Holland	110	118	101
UK	103	107	100

These indices allow for subsidy effects here, and the high German figure for phosphate prices allows for the loss of a former subsidy. It is clear that the British farmer is in no worse a buying situation than his colleagues in the four other countries, where each year fertilizer use increases more firmly. The average rates of application (in kilograms per hectare) for some countries are as follows:

	nitrogen (as N)	phosphate (as P_2O_5)	potash (as K_2O)
Belgium	55.7	55.7	82.1
Denmark	25.8	31.4	52.3
Germany	33.0	37.9	62.4
Holland	79.6	49.6	66.7
Norway	35.0	36.9	47.2
UK	21.0	29.0	21.0

These calculated figures apply to agricultural land, excluding rough grazings, so the basis of comparison is not unfair. Differing cropping policies and varieties in soil types must, of course, bring some divergences in country-by-country fertilizer needs, but these influences are not powerful enough to sweep away the obvious implication of the figures. In use of fertilizers, British farming lags well behind the best European practice.

Getting Oilier

STATISTICS recently issued by the Petroleum Information Bureau show that the use of most oil products in this country is rising steadily. Motor spirit (including benzoles) rose from 5,922,408 tons in 1954 to 6,240,391 tons in 1955, a matter of 5 per cent. Diesel fuels for road vehicles rose more sharply, from 1,413,207 tons to 1,600,677, or by about 14 per cent. Total gas, diesel, and fuel oils amounted to 6,352,235 tons in 1954 and 7,543,968 tons in 1955, a 20 per cent rise. Much of this jump is due to the increased use of fuel oil for heating. For domestic heating, lighting, and cooking alone the use of oils rose by 23 per cent. An end-use analysis for deliveries of burning oils shows increases of a substantial proportion for private and non-private central heating, bakeries, glass and ceramics production, steel, metallurgical furnaces, and steam raising. The only fall shown for 1954-55 is a minute one for agricultural driers and heaters, which reflects the smaller need for drying 1955's better harvest more than it indicates any lessening popularity. On the other hand, though we can offer no comments of an explanatory nature, production here of petroleum products from imported or

indigenous crude oils etc. fell in 1955. In 1954, 7,124,514 tons of motor and aviation spirit were produced; in 1955 the figure was 6,874,706 tons, a fall of rather more than 3 per cent. However, there were rises for some of the heavier products. Burning oils rose by 27,000 tons or just under 4 per cent, gas and diesel oil by some 390,000 tons or a little above 9 per cent. But fuel oil production dropped sharply by more than one million tons, about 9 per cent of 1954's output of 11,369,938 tons. There were excellent increases for lubricating oil and for propane and butane; lubricating oil output went up by 118,000 tons or 20 per cent, propane and butane by nearly 4,000 tons or about 7.5 per cent. On the whole, however, the output from the home-based processing and refining industry is not quite keeping pace with home consumption of petroleum products.

The Changing World

BRITISH post-war economic record is certainly not unblemished and contains a number of black spots. But there are also many bright spots, many progressive and expanding industries capable of contributing both to the modernization of British industrial plant and equipment and to the continued expansion of exports. 'There is no reason why Britain in the next decade should not be able to achieve increases in living standards at least comparable with those of the post-war decade.' This is stated in 'The Changing World,' an introductory article in *The Financial Times Review of British Industry*. The Review provides a 112-page examination of the post-war changes in patterns of production and consumption, with an assessment of the changes future years may bring and some consideration of the impact of past and prospective changes on the main sectors of British industry. Of particular interest to readers are contributions dealing with the production of chemicals from petroleum, synthetic rubber, man-made fibres, metals for modern industry and plastics. There is also much valuable information in those articles devoted to export matters, transport, fuel and power; the handling of commodities, electronics, and nuclear engineering are also reviewed and there are numerous useful contributions dealing with the economic situation at home, and with the supply and demand of consumer goods. In this connection it is interesting to note that between 1948 and 1955, the country's total output of goods and services is estimated to have risen by nearly 25 per cent, or an average of about 3¼ per cent a year, which is considerably more than twice the estimated rate of growth in the inter-war period, and probably also much higher than the rate of growth between 1880 and 1914.

Wet Contact Process

Huntington, Heberlein Development

PLANT for the production of sulphuric acid from hydrogen sulphide is manufactured by Huntington, Heberlein & Co. Ltd., who have produced a brochure dealing briefly with the theory of this process.

The method now generally adopted is known as the wet contact process and was developed by the German firm of Lurgi; the first commercial plant started in 1933.

In 1937 Huntington, Heberlein built a plant based on the original Lurgi design, the main components being a hydrogen sulphide combustion chamber, a radiation cooler, a convertor and a tubular condenser. Plants of this type worked successfully, but the cost of condenser maintenance was high.

It was found that this component could be replaced by a tower over which 78 per cent sulphuric acid is irrigated, followed by equipment for precipitating the acid mist leaving the tower.

In order to run a plant successfully, the H_2S concentration must be high enough for combustion to be maintained and for the reaction in the convertor to be self-supporting after the necessary oxygen has been added in the form of air. The gases from liquid purification processes for town gas and coke ovens have been found suitable, and also the gases from ammonium sulphate saturators.

Moisture is always present in the combustion air and in the gas containing the H_2S and hence it is impossible to produce 98 per cent acid. In order to minimize maintenance costs it has been found desirable to limit the acid concentration to approximately 78 per cent by the addition of water.

New Laboratories Opened

Warner-Lambert Developments at Eastleigh

THE new laboratories of William R. Warner & Co. Ltd., Lambert Chemical Co. Ltd., and Richard Hudnut Ltd., the British subsidiaries of the Warner-Lambert Pharmaceutical Co. of the US, were opened by Lady Pamela Berry at Eastleigh, Hampshire, on 8 June. Three days earlier, on 5 June, William R. Warner & Co. Ltd. gave a dinner in the Apothecaries Hall, London, to celebrate the centenary of the company's foundation.

Personalities Present

Among those present at the opening ceremony were Mr. Elmer H. Bobst, chairman of the Warner-Lambert Pharmaceutical Co., Mr. Alfred E. Driscoll, president of Warner-Lambert and former Governor of New Jersey, Mr. Eliot Warburton, M.C., chairman and managing director of the British group, Mr. P. E. Stoodley, the Mayor of Eastleigh, Dr. H. King, M.P., and Mr. Martin M. Howard, M.P. The mayor's chaplain dedicated the building.

The laboratories at Eastleigh cover 102,000 sq. ft. and represent the first stage in the concentration of the British manufacturing activities of the Warner-Lambert Pharmaceutical Co. In this stage, production of cosmetics and toilet preparations, together with manufacture of some of the bulkier pharmaceutical products, has been brought together under one roof. Hitherto production has been carried out at Power Road, London, and at High Wycombe.

In the second stage it is anticipated that the size of the laboratories will be doubled to take in the manufacture of all pharmaceutical products.

The new building, which was designed and built in one year, is partly of single-storey and partly two-storey construction. In the two-storey portion the manufacturing processes are on the upper floor, with chutes and conveyors feeding products downwards to the ground floor, where they are finished and filled into bottles, cartons or packages on moving platforms with automatic plant.

Unique Finishing Room

The finishing room is fitted with seven U-line belts, which are said to be unique in this type of production. Great care has been given to the design and decoration of this department. Notable features are the attractive wallpaper and various shades of green paint, large windows on three sides, giving an impression of considerable light and space, diffused ceiling lighting, and the ease of supervision afforded by the lack of partitions.

Adjacent to the manufacturing portion of the building is the warehouse with its ship-

Sir Miles Thomas (left) being greeted by Mr. Eliot Warburton at the centenary dinner of William R. Warner & Co. Ltd.

ping and receiving areas. A novel feature of this is the loading bay with a roller shelter to enclose the loading and unloading of lorries. Careful planning has also gone into the streamlining of activities in the warehouse to ensure the easy flow of incoming raw materials and outgoing finished goods. Plenum air circulation is used throughout the factory, except in the warehouse.

Three people are employed in the control laboratory, which is responsible for checking samples of incoming raw materials, and controlling the quality of products during all stages of manufacture. An inspector, who comes under the jurisdiction of the control laboratory, is employed in the finishing room to make spot checks on finished products. When all the manufacturing activities of the group are located at Eastleigh, the total strength of the laboratory will be about 12.

Group's Three Divisions

The operations of the British group are concentrated in three divisions: ethical pharmaceutical, which comprises products specially prepared for hospitals and the medical profession; lay pharmaceutical (advertised) products; and cosmetics, covering all toilet preparations. The total production staff at Eastleigh is 85, of which 25 have been transferred from London. By the end of July, the production staff is expected to total 200.

Approximately 40 per cent of the British group's products are exported. The export department supervises nearly 100 selling agents in 50 countries. These selling activities are assisted by resident representatives sent out from Britain and the US and by each country concerned.

An important additional activity undertaken by the British group is the supply of many of their raw materials to other manufacturing branches of the Warner-Lambert group in Europe, South Africa, Australia and New Zealand. This entails rigid examination before shipment to ensure correct qualities and the highest standards of these consignments.

At the centenary dinner at the Apothecaries Hall on 5 June, Mr. Elmer H. Bobst, seconded by Mr. Alfred E. Driscoll, proposed the toast to 'The Medical and Pharmaceutical Professions.' Sir Harry Platt, president of the Royal College of Surgeons, replying, proposed the health of William R. Warner & Co. Ltd. Mr. Eliot Warburton, M.C., replied on behalf of the company and went on to propose the health of the guests. Sir Miles Thomas, a director of Monsanto Chemicals Ltd., replied on behalf of the guests.

SLTC Meeting

AT A MEETING of the Society of Leather Trades' Chemists, West of England group at Yeovil Technical College, on 1 June, Mr. J. S. Mudd read a paper on measuring colour.

At the outset, Mr. Mudd showed illustrations of the ease with which the eye can be deceived in its judgment of colour. He then discussed the limitations of shade cards, colour atlases and the usual methods of maintaining colour standards and explained the reasons why a system of precise colour measurement is necessary. He dealt with the CIE system of colour measurement and described the method of arriving at the x, y and z terms of that system from the readings of the Hilger J.20 photoelectric surface colorimeter.

Mr. Mudd also indicated practical applications of colour measurement in the leather trade, particularly in connection with the system of colour tolerances evolved by the colour committee of the Society of Leather Trades' Chemists.

Working of the Hilger instrument was demonstrated by Mr. A. N. Darvill, using leather patterns. The tolerance was calculated for these patterns and the audience were able to assess visually the difference at various tolerance levels.

Mr. N. W. Palmer was in the chair.

Baird & Tatlock Appointments

The Baird and Tatlock group of companies announces that MR. J. B. LONGMAN has been appointed technical sales representative for south London and south east England in succession to MR. P. H. D. ANDREWS who is returning to South Africa. Mr. Longman was formerly a chemist in the laboratories of Safca Aerosol Manufacturing Ltd. and before that he was with the Metal Box Co. Ltd.

Chlorine & Fluorine Hazards

Safety Precautions Outlined by Specialists

SOME rules for the safe handling of chlorine were given by Mr. H. Pine of the Technical Service Department, ICI General Chemicals Division, at a recent meeting of the British Occupational Hygiene Society in Liverpool. Dr. J. D. Paterson, Medical Department, ICI General Chemicals Division, told the meeting about the hazards of hydrofluoric acid, and the president of the Society (Dr. C. G. Warner, NCB), spoke of the changing incidence of pneumoconiosis among coal miners and of the good outlook for the future.

Safety Rules

Of chlorine, Mr. Pine said: Since its use as a war gas in 1915 it had been transported as liquid and tens of thousands of tons a year were conveyed in tanks, drums and cylinders. Many users had no technical experience, and rules had been devised for their protection. Among these are the following:

(1) Liquid chlorine must be dry and the packages and valves foolproof. Filling ratios must be observed and containers serviced and tested regularly. (2) Customers should know how to use the product and to handle the packages safely. Drum and tank installations require initial inspection. Instruction and precaution cards are issued. (3) Customers should know what to do in the event of an accident. A chlorine emergency service is available to deal rapidly with trouble at the premises of any user. (4) Regular visits to customers are made to ensure that the necessary precautions are being taken.

Trichloroethylene was one of the oldest of the commercially available organic compounds of chlorine and the one made on the largest scale. Less dangerous than many others because it had no chronic effects, it had many uses in industry and could be used safely provided simple precautions were taken.

Mr. Pine also referred to the system of labels for hazardous products devised by the Association of British Chemical Manufacturers. These were intended to protect the transporters of such substances—railway employees, lorry drivers and storekeepers. They were distinctive and easily recognizable, named the particular hazard, described its nature and gave simple precautions to be observed in case of spillage, fire or other accident.

Dr. Paterson, dealing with hydrofluoric acid, said that considering only the acute effects and ignoring the chronic, this compound must be regarded as even more severe in its action than mustard gas. In designing plant, the possibility of hydrofluoric acid coming into contact with the operators should be reduced to a minimum.

Acute hazard was associated with concentrations over 20 per cent which damaged body tissues. Acid stronger than 60 per cent caused damage which was immediately apparent. A unique effect was its power of penetration to a depth where it exerted a dissolving action on cellular membranes, causing liquescent necrosis and decalcification of bone. Pain was very severe and might be immediate or delayed for some hours, according to the strength of the acid.

Treatment consisted of copious washing with water, followed by a dressing of magnesium oxide paste. An injection of 10 per cent calcium gluonate into, and around, the burned area until there was weal formation relieved more severe cases very rapidly. Chronic hazard was the possibility of fluorosis, (a condition of sclerosis of bone and, in extreme cases, ossification of the ligaments). Protective clothing, including a fresh air hood to prevent inhalation of vapour, was an insurance against fluorosis, but estimation of the fluorine content of urine was established when the hydrofluoric acid plant came into production. Risk of fluorosis was slight when the fluorine was below 10 mg/l of urine.

Daily Measurements

Excretion rate of fluorine was so high that daily measurments were necessary to detect peaks. After a time, these observations provided a valuable indication that all was well with the plant and enabled small defects, which would otherwise have passed unnoticed, to be rectified.

In spite of all precautions, said Dr. Paterson, the Medical Department still had

to treat an occasional hydrofluoric acid burn, usually due to a faulty glove, but they had never had a serious case nor a burn of the eye. He pointed out that chlorine and bromine trifluorides, which were very reactive and produced thermal burns in contact with the skin, did not penetrate in the manner of hydrofluoric acid.

Various established methods of taking samples of dust were described by Mr. G. L. Fairs, Research Department, ICI General Chemicals Division. These included isokinetic sampling downstream of a mixing baffle and horizontal elutriation for size separation. Cells for sampling mists containing particles liable to change in size by evaporation or condensation were also mentioned.

Sedimentation analysis, based on Stokes' law for the rate of fall of particles in liquid, suffered from the disadvantage that samples of the different size fractions in suspension became very attenuated towards the end of the process, and their removal created a disturbance. An apparatus was described which was better in these respects, since it worked by flushing out the settled particles for estimation.

Vertical elutriation, by blowing air through a powder to carry away fine particles which settled slower than the air speed, enabled size fractions to be determined by filtering the effluent and repeating at decreasing rates of flow.

SAC Joint Meeting

Nuclear & Paramagnetic Resonance

THE 54th ordinary meeting of the Physical Methods Group of the Society for Analytical Chemistry was held jointly with the Photoelectric Spectrometry Group at 2.30 p.m. on Friday, 25 May 1956, in the Physical Chemistry Laboratory, Oxford.

The subject of the meeting was 'Nuclear and Paramagnetic Resonance' and the following papers were presented and discussed : — 'Analytical Applications of Nuclear Resonance Spectroscopy', by R. Richards, M.A., D.Phil. (Lincoln College, Oxford).

A short description was given of what happens when a nuclear resonance spectrum is excited. Some of the factors which determine absorption line shape, width and intensity were discussed with particular reference to the analytical applications of the method. The nature of the 'chemical shift' and 'multiplet interactions' which are observable under conditions of high resolution was described.

'Techniques of Magnetic Resonance Spectroscopy', by E. E. Schneider, Dr.Phil. Nat. (King's College, University of Durham).

Electron spin magnetic resonance (usually described simply as 'paramagnetic resonance') is observed with paramagnetic atoms, ions or molecules and is associated with unpaired electron spins. Nuclear magnetic resonance is observed in diamagnetic materials and is entirely due to the magnetism of the atomic nuclei. The aspects of magnetic resonance studies which are of interest to the chemist were surveyed and the relevant experimental techniques were described.

Experimental Problems

A number of special experimental problems were discussed in some detail. These concern observation of paramagnetic resonance in aqueous solutions, the quantitative determination of the concentration of unpaired electron spins and magnetic nuclei from the intensity of paramagnetic and nuclear resonance absorption respectively, and the accurate measurement and analysis of complex paramagnetic resonance spectra of organic radicals arising from the hyperfine interaction of the unpaired electrons with neighbouring nuclei.

'The Detection of Photochemically-formed Radicals by Magnetic Resonance', by D. J. E. Ingram, M.A., D.Phil. (University of Southampton).

The technique of electron resonance has been employed for some time now, not only to observe the state and presence of normal paramagnetic atoms but also to study organic free radicals. Until recently the work on free radicals has been confined to known stable compounds. Measurements are outlined here which show that the technique can now be extended to cover many different types of radicals formed by breakage of bonds with UV irradiation.

MR. GRANVILLE SHAW, F.P.S., of Nottingham, has been elected president of the Pharmaceutical Society for the coming year. He has been a council member since 1946. MR. DONALD HUDSON, M.P.S., of Hove, has been elected vice-president, and MR. W. SPENCER HOWELLS, M.P.S., of Richmond, has been re-elected treasurer.

Electrochemical Research in India—1955

by N. R. SRINIVASAN, M.Sc., Ph.D., M.I.I.M., M.Electrochem.Soc.(US)

ELECTROCHEMICAL research in India during the year under review has been characterized by pilot plant preparation of electrolytic manganese, electrodeposition studies on iron and nickel, plating of chromium and brass, work on gold, platinum and resin membrane electrodes, polyelectrolyte character of substances, industrial production of calcium carbide and other chemicals, and the evolution of new techniques aiding electrochemical work.

Manganese Ores

In view of the enormous quantities of low grade manganese ores accumulating in several States of India, attempts have been made at their utilization through the electrolytic production of manganese metal in pilot plant trials (**1**). A sample of ore carrying 30 per cent manganese from Sandur, Mysore State, has been employed. The ore is given a reduction roast at 600-700°C and is leached with the anolyte overflow from electrolytic cells mixed with sulphuric acid around *p*H 1.0 in lead-lined wooden vats. The leach is purified by treatment with ammonia and removal of sludge, followed by reaction with hydrogen sulphide. The electrolysis is carried out in lead-lined wooden vats (2 ft. by 1¼ ft. by 2¼ ft.) with stainless steel cathodes (16 in. by 9 in.) finished to semi-mirror polish, and perforated lead-silver (one per cent) alloy anodes. After working out several conditions the following optimum cell characteristics have been arrived at:—

$(NH_4)_2SO_4$ in catholyte	145-155 g/l.
Mn	10-12 g/l.
Mn in feed	32-36 g/l.
SO_2	0.2-0.4 g/l.
Cathodic current density	30-50 amp./sq. dm.
Temp.	30-33°C.
Catholyte *p*H	8.0

It has been found that good silver white deposits, with a maximum current efficiency of 62.5 per cent, have been obtained. For stripping the manganese metal, the cathodes are dipped in one per cent potassium dichromate, washed and dried. The metal has been prepared in 10 lb. lots having a purity of over 99.9 per cent.

Iron powder, suitable for powder metallurgy work after heat treatment, has been prepared by electrodeposition (**2**). Using unbagged commercial mild steel anodes and anodized stainless steel cathodes, bath compositions of ferrous sulphate with ammonium chloride or sulphate have been tried. The higher the iron content of the bath the greater is its throwing power together with more uniform deposits. The cathode current density has been maintained between 30 and 45 amp. per sq. dm. If the anodic current density exceeds 50 amp. per sq. dm., rapid deterioration of the electrolyte occurs due to excess oxidation and rapid depletion of iron. The Vickers Pyramid Hardness number of the deposits decreases from 566 to 356 with increase of *p*H from 3.0 to 5.1. Rod cathodes give thick deposits free from defects such as peeling and cracking but with lower hardness values. The deposit assays 99 per cent iron.

The electrodeposition of nickel from pyrophosphate bath has been undertaken (**3**). A bath has been prepared by the addition of sodium pyrophosphate solution to nickel pyrophosphate, resulting in complex formation with alkali chloride to facilitate anode corrosion and ammonium citrate to act as buffer and to give brighter deposits. The optimum conditions worked out are:—

Ni 29.4 g/l; P_2O_7 175-205 g/l; KCl 10 g/l; Am. Citrate 20 g/l; *p*H 8.5-9.5; Temp 50-60°C; Current density up to 5.4 amp./Sq. dm., bath voltage 2.5-3.5.

Cathode of Copper or Zinc

A cathode of copper or zinc and rolled nickel anode have been used with a cathode efficiency of 85-95 per cent. The bath has good throwing power and its performance can be improved by the addition of sodium bisulphite, cadmium sulphate and α-nitroso-β-naphthol. The structure and orientation of electrodeposited nickel from a sulphate-boric acid bath have been studied by electron diffraction (**4**). From a bath containing 280 g. per litre of nickel sulphate and 31 g. per litre of boric acid, the metal has been electrodeposited on brass at temperatures varying from 26-75°C and current densities of 10-70 mA per sq. dm. The thickness of the deposit is of the order of 30,000 Å. At

*p*H4 and above, the orientations of the deposits at 26°C are found to be {100} characteristic of lateral growth and {110} characteristic of outgrowth at 75°C. At lower *p*H a new orientation {210} appears especially when evolution of hydrogen is vigorous. The orientation and structure are affected in some way by the co-deposited hydrogen.

Hard Chromium Plating

Piston rings of internal combustion engines are plated with hard chromium to improve and prolong their service life (**5**). Optimum conditions have been worked out for piston rings up to 3.5 in. diameter suitable for Petter-Kirloskar 5 HP Diesel engines as also for single and multitype loco piston valve rings up to 12 in. diameter. The hard plated materials are being tested at the Railway Testing and Research Centre.

Techniques for getting multi-coloured relief designs and photographs on aluminium by anodic oxidation methods have been evolved for decorative purposes. Brass plating from an electrolyte containing an alkaline solution of copper sulphate in glycerine and sodium zincate has been tried with a stainless steel cathode rotating at 800 r.p.m. and a brass cylinder anode (**6**). The deposit carries more copper with an increase in Cu/Zn ratio while increase in current density causes a decrease in the copper content of the deposit. Increased cathodic polarization produces a deposit containing relatively larger percentages of zinc. The higher current efficiencies of more than 100 per cent encountered have been attributed to the presence of monovalent copper ions in the solution derived from the brass anode. Standards in plating from the standpoints of thickness of deposits, adhesion, stress and porosity of zinc, cadmium and nickel coatings have been recommended, especially for tropical conditions (**7**).

In a study of the surface characteristics of gold and platinum electrodes, it has been found that the measured e.m.f. of platinized platinum and platinized gold are nearly the same *viz.*, 0.4780 and 0.4765 (calculated 0.4768) in respect of 0.05 M potassium hydrogen phthalate (*p*H 3.98), while gold plated gold and gold plated platinum electrodes gave unreliable values (**8**). The difference in behaviour has been attributed to the polarization of the electrode and the lower adsorption power of the gold surface for hydrogen ions as compared to the platinum surface. In using gold electrodes, a sharp point of equivalence has been observed in titrating potassium ferrocyanide containing one per cent ferricyanide with copper and zinc sulphates. The composition of the ferricyanide complexes reveals that the maxima or minima of dE/dc are brought about in the same range of $\underline{Fe\ CN_6}$ | $\underline{Fe\ CN_6}$ in such redox titrations (**9**).

In copper ferrocyanide sol studies, a new equation has been formulated connecting electrolyte concentration and time of coagulation, $C = a + (m/t/(n + 1/t)$ where C is electrolyte concentration, t is time of coagulation and a, m and n are constants (**10**).

The conductivities of solutions of arsenious oxide at different concentrations, 0.0418-0.5618N, at 35° ± 1°C increase steadily when measured over a number of days (**11**). It has been stated that the increase is due to the conversion of arsenious to arsenic acid by dissolved oxygen, as found by iodine titre and as calculated from conductivity data, and is catalysed by platinum black.

Thin Membranes

Thin membranes prepared from ion exchange resins can be used as reversible electrodes with respect to various cations and anions. Some which are reversible with respect to hydrogen ions have been used for carrying out acid-base titrations (**12**). Ionac A-300 membrane electrodes have been used in the quantitative estimation of chloride and sulphate ions. In experiments with resin membrane electrodes satisfactorily registering Ba^{++} and Cu^{++} ion activities in electrolyte solutions, the measured and calculated e.m.f. values show good correspondence (**13**).

Clay membrane electrodes have been developed for the measurement of zinc, manganese and cobalt ion activities; the potentials of the cell systems were determined using calomel electrodes and the measured e.m.f. values compared within one per cent of those calculated according to the Nernst equation (**14**). An equation for the total potential of clay membrane electrode has been given (**15**). The variation in chloride uptake by cation exchange membranes in hydrochloric acid, sodium chloride and barium chloride solutions has been reported (**16**).

In results obtained with Nepton CR-51 cation exchange membrane in barium, magnesium and calcium salt solutions, the amounts of chlorine adsorbed by the Donnan diffusion process have been determined (**17**). The quantity of anion diffusing into the cation-exchange membrane has been found to depend on the ionic radius of the cation and, among cations of almost similar ionic radii, on their charge and valency. The potentialities or resins and membranes in solving fundamental problems in electrochemistry and for practical utility as in treatment of brackish waters have been outlined (**18**.)

Importance of Calcium Carbide

The importance of calcium carbide as an industrial raw material has led to its electrical preparation and an assessment of such factors as raw materials for its manufacture, such as limestone, coke, lignite and electrode paste, power consumption and cost of production in India (**19**). With copper sheet as anode and copper cathodes separated by cloth in an alkaline salt solution kept at 80°C, cuprous oxide has been found to be formed near the anode with a current efficiency of 94 per cent (**20**). The electrolysis of sodium sulphate between lead anodes conducted by a flowing mercury cathode process has been undertaken in a concrete electrolyser coated with chlorinated rubber (**21**). With a cell voltage of 5.3-6 and a current density of 10 A per sq. dm., the electrolysis yields 50 per cent caustic lye and 15-17 per cent sulphuric acid mixed with sodium sulphate, at 90 per cent current efficiency. The possible utilization of an electrothermal process for the large scale processing of monazite has been outlined (**22**). A critical review of the separation coefficient, electrode efficiency and influence of such factors as temperature and cell design has been made regarding the electrolyte preparation of heavy water (**23**).

The polyelectrolyte nature of sodium xylanmethyluronate (SXMU) from jute has been studied (**24**.) The conductivity of SXMU solution, unlike strong or colloidal electrolytes, increases with dilution at first slowly and then rapidly. The equivalent conductivity of SXMU is higher than that of sodium alginate but much less than that of sodium carboxy methyl cellulose. The dissociation of SXMU is suppressed in presence of added electrolytes. SXMU behaves as a polyelectrolyte in dilute solutions and fits in well with the flexible chain theory of Fuoss. Its properties are similar to those of other polyclectrolytes, differing only in degree due to its low charge density and lower molecular weight. The polyelectrolyte nature and the linear character of the molecule of gum tragacanth have been elucidated through viscosity measurement (**25**).

Among other lines of work mention should be made of a new method for measuring electrical resistivities, by inducing a momentary e.m.f. in a plane uniform ring of a conductor suspended in a homogeneous magnetic field and observing the resulting ballistic throw (**26**). The ballistic throw is given by the equation

$$\theta = \frac{A^2TH^2a}{8\pi I\rho L}$$

where I is moment of inertia, T is the period of oscillation of the suspension, A is area of the ring, a is area of its cross section, L its circumference, H the magnetic field and ρ the resistivity. A value of resistivity of 1.83×10^{-6} ohm cm. at 25°C for copper has been obtained and agrees well with the known value. An electronic relay for thermostatic control especially suitable for electrochemical work has been constructed and a bath temperature control of $\pm$ 0.005°C has been reported to be attained (**27**). A mechanism of potential inversion of the Joshi effect has been postulated (**28**.)

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· PERSONAL ·

SIR FRANCIS SIMON, F.R.S., professor of thermodynamics at Oxford, has been appointed to succeed LORD CHERWELL, F.R.S., as Doctor Lee's Professor of Experimental Philosophy and head of the Clarendon Laboratory on 1 October. Sir Francis Simon was formerly professor-ordinary and director of the Physical Chemistry Laboratory, Breslau, and came to Oxford in 1933 at the invitation of Lord Cherwell, then Professor Lindemann. He was closely associated with Lord Cherwell in the Clarendon Laboratory and did considerable work on low temperature physics. He is a consultant to the Atomic Energy Authority and during the war was connected with the atomic energy project from its inception.

DR. T. VICKERSTAFF, B.Sc., M.Sc., Ph.D., A.R.I.C., F.S.D.C., has been appointed chief colourist of ICI Ltd., Dyestuffs Division at Blackley, Manchester. He succeeds MR. G. O. MITCHELL who retires after 37 years' service. Dr. Vickerstaff joined ICI in 1935 and became head of the dyeing research section in 1942. He has made valuable contributions to the study of colorimetry and is a leading member of the colour group of the Physical Society. He is author of the text book *The Physical Chemistry of Dyeing.* In 1942 he was awarded the research medal of the Society of Dyers and Colourists as senior author of the paper *The Dyeing of Acetate Rayon with Dispersed Dyes.*

MR. A. J. L. NASH, BSc., A.C.G.I., M.I.E.E., general manager of R. Cruickshank Ltd., industrial chemical manufacturers, metal finishing specialists and electroplating engineers of Birmingham, has been appointed managing director of the company. This firm is embarking on an extensive development programme within the field of its specialized manufactures.

Left, Dr. T. Vickerstaff, ICI Ltd. Right, Mr. A. J. L. Nash, Cruickshank, Ltd.

Two new Fellows, one from South Africa and one from India, have been elected by the Textile Institute. They are MR. NORMAN CRYER, of Pretoria, and DR. NATESAN RAMANATHAN, M.Sc., Ph.D., A.Inst.P., of Bombay. Mr. Cryer, a graduate of Leeds University, has been a member of the Institute since 1930, and an Associate since 1931. He has had wide teaching experience and given much service to the industry. He is now principal technical officer and head of Textiles Division, South African Bureau of Standards, Pretoria. He is also a member of the South African Panel of the Institute. Dr. N. Ramanathan, who is a Ph.D., of both Bombay and Leeds Universities, joined the Institute in 1952 and is now senior lecturer, Textile Department, Victoria Jubilee Technical Institute, Bombay.

Under the terms of the scheme to commemorate the late Lord Rutherford of Nelson, the council of the Royal Society has appointed PROFESSOR E. N. da C. ANDRADE, F.R.S., to deliver the Rutherford Memorial Lecture for 1957 in Australia. The council of the Royal Society has also appointed MR. A. M. SEGAR, a graduate of the University of Melbourne, as a Rutherford Scholar for three years from 1 October 1956, to carry out studies in nuclear physics at the University of Birmingham.

The Court of the Salters' Company has elected F. W. EASTWOOD, R. C. SHEPPARD and L. KEAY to be Salters' Fellows for the year 1956-57, and has extended the Fellowship held during 1955-56 by M. J. STEPHEN for a further year. The Court has also offered scholarships to: A. R. SANDERSON (King's College, Newcastle-upon-Tyne), P. S. Houston (Battersea Polytechnic) and A. A. Webb (Imperial College); and is extending the scholarships already held by: P. L. LEVINE (Imperial College); B. B. HUNT (Cambridge).

German Chemical Imports Up

Bayer to Invest DM600 m.

CHEMICAL production in the German Federal Republic rose by eight per cent in the first quarter of this year, compared with the corresponding period of last year. Chemical exports rose by a similar margin, but chemical imports increased by as much as 15 per cent. Among exports, dyestuffs and nitrogenous fertilizers showed a decline, as did basic chemicals, while on the import side the increase was chiefly due to larger receipts of semi-finished and finished manufactures. Imports of chemical raw materials rose by six per cent only.

German chemical manufacturers feel some concern at the Government's proposed anti-inflation measures, as was shown by the critical remarks made at the shareholders' meetings of the leading companies in the past fortnight. Prof. Wurster, of Badische Anilin- und Soda-Fabrik, described general restrictive measures as dangerous; the German chemical industry was not faced with 'an overheated boom' but on the contrary was struggling hard to maintain itself in 'frosty world markets.' Both Prof. Haberland, of Farbenfabriken Bayer, and Prof. Winnacker, of Farbwerke Hoechst, pleaded against general and one-sided cuts in import duties, but the former agreed that some import duty reductions were desirable, especially for products which had or were likely to become dearer. The recent rise in the German bank rate is apparently accepted as inevitable; Government plans for scaling down initial depreciation allowances, on the other hand, have aroused criticism.

Capital Expenditure

Farbenfabriken Bayer envisages capital expenditure exceeding DM600 million in 1956-58, of which DM350 million is accounted for by new plant already under construction. The rate of capital expenditure, which has risen from DM50 million in 1949-50 to DM100 million in 1951-53, and gone up since, will thus be increased further. All sections will require new capital expenditure, though to varying degrees. DM100 million are to be spent in the next three years on extensions to the distributing network and manufacturing bases for the purpose of encouraging sales in foreign markets.

An annual sum of DM62 million is currently spent on research by Farbenfabriken Bayer, in addition to DM17.7 million expended on new laboratories and laboratory extensions. Part of the new central laboratory at Leverkusen, regarded as 'probably the most modern one in Europe,' has been put into use. Prof. Haberland mentioned that his company was about to open a new raw material basis and field of operations. A cracking process for the production of gaseous olefines, especially ethylene, which has been designed by Lurgi GmbH and Ruhrgas AG on a small scale, has been developed by Bayer; a cracking plant operating this process will start operations at Dormagen this year.

Shortage of Coal & Electricity

Prof. Winnacker said that the long-term raw material position of Farbwerke Hoechst was characterized by shortage of coal and electricity. Increasing quantities of US coal would have to be imported, and much research work was being done to open up new sources of energy. The establishment of an oil cracker at Hoechst was the first result of this work; it would, at least, meet the additional demand not satisfied by enlargement of the carbide production. It could not yet be said whether the gap in energy supplies could be closed in time by atomic power. Farbwerke Hoechst were taking a financial and practical part in the erection of a nuclear reactor at Karlsruhe. Shortage of labour and constantly rising wages necessitated increased rationalization and automation. This would be one of the key points of future capital expenditure; this year over DM200 million are to be invested.

The West German potash industry increased its sales in the year ended 30 April by seven per cent to 1,620,000 tons (K_2O). Home sales rose by four per cent to 900,000 tons and exports by 11 per cent to 715,000 tons. The British market continues to be the principal foreign market and absorbed 113,300 tons, against 110,000 tons shipped to Japan.

Italian Chemical Industry

Interesting Display at the 34th Milan Fair

THE pavilion of the Montecatini Company, a point of particular interest at the thirty-fourth Milan Fair, 2-27 April, displayed the new products of this company.

The Montecatini Group consists of 48 mines, quarries and saw mills, 63 plants for the preparation of chemical products, eight plants for synthetic nitrogenous products, one plant for hydrocarbon derivatives, three plants for dyestuffs, two plants for pharmaceutical products, seven plants for synthetic fibres, 17 metallurgical factories, 13 power stations, four Institutes and numerous laboratories for pure and applied research.

A panoramic view of this multiform activity was offered by the first room of the pavilion, while the second one was devoted to the Montecatini mines.

Sulphur Extraction Plant

A large space was devoted to the new plant built in Passarello for sulphur extraction and incorporating a special patented Montecatini-Lurgi furnace, cost of which amounts to some hundreds of millions of lire: the plant will permit the exploitation of low-grade deposits and will give a reduction of costs that will attenuate the present crisis in the Italian sulphur industry.

In the third room were displayed the Montecatini products for agriculture: a special mention was deserved in particular by concentrated and complex granular fertilizers which reduce the costs of conveyance, packing and application, and permit a complete treatment by means of one product, realizing a highly efficient localization near the roots.

Among the products developed by the Montecatini Group for the fight against parasites were displayed: FAC 20, a new phosphoric-ester for the spring and summer defence of orchards; Carposan 50, a powerful parathion-based contact insecticide; Aspor, an excellent remedy against the vine peronospora; colloidal sulphur that in reduced doses is effective against numerous cryptogam-originated diseases; a new insecticide against the olive and cherry fly, that in the versions Rogor P (to be atomized) and Rogor L (to be sprinkled) will be particularly useful to the Italian agriculture: it penetrates the drupes and kills fly, eggs and larva.

Among the cryptogam's antidotes were displayed, besides cupric sulphate, refined sulphur, ferrous sulphate and Tiezene. Among insecticides, lead arsenate, barium polysulphide (trade name: Tiobar), DDT-based Gesarol, tetraethylpyrophosphate based Toxfid, parathion-based Carposan 20, hexachlorocyclohexane-based Fitogamma, etc.

The fourth room was dedicated to plastics and new realizations for the textile industry, the fifth to aluminium, the sixth to Duco products and the seventh to the activity of Rhodiatoce, a Montecatini-associated company.

NIFES Refresher Course

THE National Industrial Fuel Efficiency Service will hold its third annual refresher course for works and plant engineers at Oxford from 24 to 28 September 1956. As previously, the lectures and discussions will be held in the Clarendon Laboratory and accommodation will be provided at Brasenose College.

The syllabus will include talks on refrigeration, heating and ventilation, nuclear energy and automation as applied to fuel efficiency.

Full particulars may be obtained from the area engineer, NIFES, Ailsa House, 181 Kings Road, Reading.

Rhodesia Fertilizer Plan

ACCORDING to the Canadian magazine *Foreign Trade*, considerable expansion of fertilizer production in Rhodesia is planned, and by 1958 the Federation of Rhodesia and Nyasaland may be independent of imported fertilizers. The project, so it is said, includes the installation of both phosphoric acid and sulphuric acid plants of 150,000 tons a year capacity. Equipment is being purchased in Europe. It is understood that ICI Ltd, through their subsidiary company in Africa, are interested in expanding fertilizer sales in the Federation. There is a fertilizer factory at Salisbury.

TITANIUM Safety Standards

US & British Recommendations

On 18 April a minor explosion occurred in the titanium plant of Imperial Chemical Industries Ltd., at Witton, near Birmingham. No one was injured but some damage was done to the plant. It is reported that the explosion was caused by a puncture in a crucible, which allowed the entry of water or steam. The likelihood of such explosions appears to be extremely limited, says ICI, but as a result of this incident and reports of similar explosions in the United States the titanium melting plant has been temporarily closed down until appropriate safety precautions have been instituted. Stocks of melted material have been sufficient to meet demands and appreciable delays in supplies to customers are not anticipated.

THE incident reported stresses the necessity for stringent precautions in the handling of titanium throughout all stages of its manufacture and processing. The advance reports to the 60th annual meeting (Boston, Mass, 4 to 8 June) of the National Fire Protection Association in the United States contains in considerable detail 'Standards for the Processing, Handling and Storage of Titanium.'

The introduction to the section on titanium says: 'These standards have been prepared to call attention to some of the fire and explosion hazards associated with the production and use of titanium. Information and recommendations are based on present knowledge of the properties and characteristics of the metal and processes now in vogue. . . In addition to fire hazards it is known that fine titanium powder, like many other finely divided metal powders, presents a serious dust explosion hazard and this characteristic is mentioned briefly in these standards pending a more complete treatment of this phase of the problem by the Dust Explosion Hazards Committee.'

Difficult to Extinguish

One of the main points to emerge from a study of this report is the difficulty of controlling or extinguishing a titanium fire. Water must not be used on titanium fires as, almost invariably, a violent explosion will occur. Carbon dioxide is not effective because finely divided titanium will burn in this gas. In some experiments it is reported that carbon dioxide seemed to stimulate the fire. Foam extinguishers are not effective because of the large amount of water they contain and carbon tetrachloride has not been effective on any of the test fires reported. Inert gases such as helium and argon will extinguish titanium fires if they can be applied under conditions which exclude all air.

Pending further experimental work, dry sand and certain dry powder compounds recommended for magnesium fires are suggested as the best methods for the control or extinguishment of titanium fires.

The production of metallic titanium involves the reduction of titanium tetrachloride with either magnesium (Kroll-US Bureau of Mines process) or sodium (ICI process). Both reductions must be performed in dry, oxygen-free atmospheres and helium or argon can be used. Fire-resistant or non-combustible materials should be used for the construction of rooms which contain reaction chambers and furnaces and provision should be made for explosion venting. Care should be taken in the storage or handling of titanium tetrachloride.

Protective clothing is insisted on as being essential for employees engaged on tapping operations where molten metal may be present. Clothing must be fire retardant, easily removable with snap fasteners and without cuffs or pockets. Caps or hoods with standard-type face protectors should be worn.

Good Housekeeping

In melting and rolling plants it appears that accidents can be guarded against by 'good housekeeping,' i.e., by keeping the plant clean, removing combustible materials before they have time to accumulate, and observing the precautions necessary in any plant where molten metals are handled.

It is in machine shops that the dangers are probably greatest because they are less likely

to be realized. Small chips and particles of dust are produced in many machining operations and these can present a serious explosion risk if they are allowed to accumulate where the material can be dispersed to form a dust cloud. Suction is recommended as being the best method of removing dust which should be collected in a wet-type collector. Larger particles should be brushed into metal containers which are emptied at frequent intervals.

Descriptions are given in this report of suitable designs for dust removers. Each machine should be equipped with its individual dust separating unit, and the power supply to each unit should be interlocked with that of the machine so that in the event of any failure of the dust-separator, the machine it serves will shut down.

Sludge from dust-separators should be removed as often as possible, at least daily. The material should be disposed of by mixing with sand and burying or burning by approved methods.

Special precautions are necessary in shipping and handling titanium powder because of its flammable and explosive characteristics. Some powder is shipped wet in tightly closed cans and in other cases double containers, securely sealed and flushed with an inert gas, are used.

Resistance to corrosion has been stressed as one of the outstanding properties of titanium says the report. It does not rust, is not affected by sea water and resists the attack of many corrosive acids. Red fuming nitric acid, however, has been found to produce a violent explosion on many occasions.

Spontaneous ignition has occurred in fine, oil-covered titanium chips. Such fires are very difficult to control and fine scrap, particularly oil-covered material should be segregated from other combustible material.

FPA Gives Advice on Titanium Hazards

CONCISE information on the hazards of titanium has been compiled by the Fire Offices' Committee Fire Protection Association in London in response to a request from William Jessop & Sons Ltd. of Sheffield who are the only other large scale processors of titanium in this country. Jessop were notified by ICI of the explosion at Witton. Their director of research, Mr. G. G. Harris, said that they had had no trouble. Their plant was newer than ICI's and was designed with fuller information available about the metal.

The text of the FPA's advice is as follows:—

The bulk metal is considered non-hazardous in normal circumstances, but titanium metal powder, even when moist, is flammable and a dangerous fire hazard. The metal powder should be stored in a cool, ventilated place away from sources of ignition and powerful oxidizing agents. When the powdered metal is used industrially, care should be taken to provide good ventilation so that the concentration of dust in air does not reach explosive proportions.

Powdered titanium metal presents a more serious dust explosion hazard than that of magnesium and aluminium powders.

Steps should be taken to collect the dust at the point of production and prevent, as far as possible, its dispersal to the atmosphere or its accumulation on surfaces. The installation of a dust extraction plant and, for dust which escapes the extraction plant, a vacuum cleaning system, would be the most useful method.

All electrical equipment should be flameproof and no source of ignition should be allowed in the buildings housing the power-producing or handling machinery. The accumulation of static electricity should be prevented by bonding and earthing any machinery employed.

Where titanium dust may be present in the atmosphere, some form of explosion venting will be necessary. Grinding operations should be isolated from other processes.

Titanium hydride also has a high dust explosion hazard.

Titanium metal turnings can be readily ignited with a match or cigarette lighter.

The common types of fire extinguisher are not effective on titanium. Dry powders which have been found suitable for magnesium (e.g. powdered talc, hard pitch, powdered graphite, magnesium oxide and powdered asbestos) can be used effectively on small fires where it is possible to bring about smothering.

Carbon dioxide, sodium bicarbonate, nitrogen and water are unsuitable extinguishing agents.

Water Pollution Research

First Full Year's Work at Stevenage

THE first complete year's work at the new Water Pollution Research Laboratory at Stevenage is reviewed in 'Water Pollution Research 1955' published by the Department of Scientific and Industrial Research and available from HM Stationery Office, price 4s.

As well as the laboratory's own staff, members of the staffs of the Ministry of Agriculture, Fisheries and Food, the National Coal Board, and the Freshwater Biological Association are now working at Stevenage on particular problems of pollution.

As part of a survey of the Thames estuary a study has been made of the effect of synthetic detergents on river water. Experiments were described in the last report which showed that the addition to water of proprietary washing powders containing anionic surface-active agents markedly reduced the rate of solution of oxygen from air under some conditions of agitation of the water. When the initial exit coefficient was between about 10 and 23 cm per hour this reduction sometimes amounted to as much as 50 per cent. When, however, the initial exit coefficient was less than five cm per hour the detergent had little effect. Although with low concentrations of active agents the reduction increased with increasing concentration, little further change occurred when the concentration of active agent exceeded one p.p.m.

Conclusions Confirmed

These conclusions have been confirmed on the whole by work during the past year. Further work has shown that it is impossible to determine with any degree of precision the effects of sewage, sewage effluents and surface-active agents on the exit coefficient, particularly since these effects will change with changes in the exit coefficient of the estuary water brought about by varying weather conditions. It may, however, be possible to assess the relative order of the amounts of the different factors in modifying the rate of absorption of oxygen in different parts of the estuary.

This section concludes with the words: 'The most that can be said is that it seems likely that part at least of the deterioration of the conditions of the estuary in recent years is due to the introduction of surface-active agents, the effect of which is in agreement with what would be expected from the results of laboratory experiments.'

Destruction of Cyanide

Previous reports have described experiments on the biological destruction of cyanide in percolating filters. The rate of application of the cyanide solutions (60 gallons per cubic yard per day) and the depth of the filters (4 ft. to 6 ft.) were both based on normal practice in the treatment of filters since the experiments began with an investigation of the effect of cyanides on the treatment of sewage in percolating filters.

It was pointed out by an industrial firm that it would be useful in saving space if the same amount of work could be obtained from a given volume of medium in a deep filter of correspondingly smaller cross-sectional area. A filter 15 ft. deep and one foot in diameter was therefore constructed and was provided with off-takes at approximately one foot intervals so that the process of removal of cyanide through the filter could be studied.

For seven days a solution of sodium cyanide corresponding to 15 p.p.m. HCN was applied at a rate of 16 gallons per cubic yard per day. Although the filter had not been inoculated with bacteria there was a loss of 66 per cent of cyanide, presumably due to volatilization. On the seventh day an inoculum of coke from a working cyanide filter was placed in the new filter and was covered with a two inch layer of graded gravel. Conversion of a small amount of cyanide to ammonia was detectable after about a week and complete removable of cyanide was observed after 16 days.

The rate of application of solution and the concentration of cyanide applied were then raised gradually to 150 gallons per cubic yard per day and 68 p.p.m. respectively; under these conditions, and with the temperature maintained at 22°C, practically the whole of the cyanide was removed. On certain occasions when the temperature fell

11°C. removal of cyanide became less efficient.

In response to requests for advice on treatment of waste oil emulsions experimental work has been done to determine the optimum concentrations of chemicals required for breaking particular emulsions. The washing of aircraft with detergent preparations containing thinning oils and dispersing agents gives rise to waste waters containing as much as eight per cent emulsified oil and having a permanganate value of the order of 1,400 p.p.m. Relatively large concentrations of aluminium sulphate and sulphuric acid were found to be necessary to break these emulsions. Acid alone and common salt were also effective. The use of aluminium, ferric or calcium salts resulted in the formation of very bulky precipitates unless the *p*H was reduced to about 2.6, probably because the detergent preparation contained a considerable amount of phosphate.

Treatment plants are being installed at airfields where aircraft are washed in this way. Common salt and aluminium sulphate are the reagents used. Separated oil is drawn into a collecting pit and the aqueous layer is discharged into the sewer.

Jacket Heating Control

Thermostatic Valve Method

IN the chemical industry the advantages of the system of jacket heating for processes which require bulk quantities of materials to be kept at a constant temperature during certain stages of their manufacture have long been appreciated and a large variety of equipment is available for heating jacketed vessels. Of all the methods employed, however, the most efficient and economical is that which utilizes an existing hot water or steam pressure system.

The Leonard thermostatic valves manufactured by Walker, Crosweller & Co., Ltd., of Cheltenham, are claimed to provide industry in general with a cheap and effective means of controlling the temperature of the water fed to jacketed vessels.

This type of valve incorporates a thermostat consisting of a by-metallic coil which, expanding or contracting in accordance with the changes in the temperature of the water, moves a sleeve which opens or closes the ports through which the cold and hot water (or steam) supplies pass into a mixing chamber. Should either supply fail, the thermostat immediately closes against the other supply.

Leonard thermostatic valves are as effective in operation with a battery of vessels as with a single one and will feed heating coils instead of jackets. The maximum operating economy is obtained with a recirculating system, the make-up of steam entering the system being usually in the region of one to two per cent.

The cost of equipping a new installation with this system of temperature control is comparatively small. When an existing plant is converted to it the cost is said to be almost negligible. Leonard thermostatic valves require the minimum of maintenance, all working parts being readily accessible for the removal of any deposits that may be caused by the hardness of the water. Not the least of the advantages of this system is its simplicity of operation. By turning a knob the operator can select and regulate the temperature of the water and once this is set he is free to attend to other duties.

Automatic Gas Washer

A SELF-contained unit for producing intimate contact between gases and liquids, for use in gas washing, acid fume and dust removal, and suppression of objectionable odours is the description of the automatic gas washer made by the Kestner Evaporator & Engineering Co. Ltd.

It is claimed that this unit provides a very high degree of turbulence in both the gas and liquid phases, a fact which reduces the thickness of the gas and liquid films through which the reactants have to diffuse, and which account for the major part of the resistance to absorption of soluble components.

Work carried out by various investigators has shown that the absorption of gases in sprays is at a maximum during and immediately after formation of the spray droplets and their impact at the end of their travel.

The rate and frequency of drop formation in the Kestner plant is claimed to be very high, giving a much higher absorption rate per unit volume than is possible in other similar types of plant.

Will

MR. CHARLES WATSON MOORE, of Grappenhall Cottage, Grappenhall, former technical director of Joseph Crosfield & Sons Ltd., left £22,166 gross, £21,949 net.

The Case of Mr. Lang

House of Commons Discussion

MR. REGINALD MAUDLING, Minister of Supply, was asked questions in the House of Commons on Monday, 11 June, about the refusal of Government contracts to ICI Ltd. so long as Mr. J. H. A. Lang, an assistant solicitor of the company, had access to secret information. (See THE CHEMICAL AGE, 9 June.)

The Minister said: 'Imperial Chemical Industries Ltd. have been informed that the Ministers responsible are not prepared to place secret contracts with them in circumstances which would enable Mr. Lang to have access to secret information disclosed in connection with them. Any subsequent action taken in relation to Mr. Lang's employment is the responsibility of the company. The Government's decision was confirmed after representations made by Mr. Lang, at his request, to a representative of the Ministers concerned had been exhaustively considered.

'I am not prepared, for reasons the House will appreciate, to make public the information available to Her Majesty's Government. But I can say that the Government have followed the recommendations of the Conference of Privy Councillors on Security. Mrs. Lang's political associations were one of a number of matters taken into consideration.

Privy Councillors' Conference

'When the White Paper on the Privy Councillors' conference was published it was pointed out to Mr. Lang that as a result the procedure of the "three advisers" might be extended to people outside Government employment, and he was asked whether he would prefer to wait until it was known whether this arrangement would be put into effect and then avail himself of it. But he preferred to proceed by way of interview with a representative of the responsible Ministers.'

Mr. William Griffiths pointed out that the case had caused widespread uneasiness in the country and added that if it were true that the action against Mr. Lang was being taken because of his wife's former membership of the Communist party, it was the first case in which a non-civil servant had lost his employment because of 'guilt by association.' It was a departure from previous security procedure which the House should examine as soon as possible.

Mr. Maudling replied that it did not represent a departure either from precedent or from the recommendations of the Privy Councillors' conference. He added that Mr. Lang was not informed that Mrs. Lang's previous political connections were the only matter taken into account by the Government.

Mr. J. Grimond asked why, if Mr. Lang was considered a bad security risk in 1951, he was left in charge of secret information for four years. Mr. Maudling replied that it was the Government's responsibility to ensure that secret information did not become available to people to whom they believed it should not.

Mr. Shinwell's Question

Mr. Shinwell asked what were the 'other matters' to which Mr. Maudling had referred in addition to Mrs. Lang's previous political associations. 'Is it not rather remarkable,' he added, 'that a man can be dismissed without any definite charge being made against him which is made public'.

In reply, Mr. Maudling said: 'Ministers have a solemn responsibility to safeguard State secrets, and in the course of that responsibility not only have the right but the duty to exclude from access to those secrets people whom they do not think suitable. In such circumstances it has been recognized that it is not possible in those cases to publish the information on which a decision has been reached by Ministers.'

Mr. Clement Davies, leader of the Liberal party, and Mr. Grimond, tabled a motion calling upon the Government to review again the machinery for dealing with security cases which arise outside the Civil Service organization.

The Association of Supervisory Staffs, Executives & Technicians passed an emergency resolution at its annual conference on 11 June, 'viewing with alarm the circumstances in which Mr. John Lang is to be dismissed from his post at ICI as a result of Government pressure.'

On Friday of last week (8 June) ICI sent a letter of dismissal to Mr. Lang. This stated that the company had 'no alternative' but to bring Mr. Lang's employment with ICI to an end.

Harwell Open Days

Recent Work on Show

DURING the last week in May the press were invited to the Atomic Energy Research Establishment at Harwell and were given an opportunity of seeing some of the more recent developments, including some of the newer research reactors, some of the new research machines and a wide variety of other research work now being undertaken.

The work at Harwell covers a wide field. The staff are responsible for the early work and basic science and technology primarily directed towards the civilian aspects of atomic energy.

Work is carried out in conjunction with the Industrial Group on nuclear power stations. Two types of reactor are being investigated. The first uses water to surround the uranium rods and transfer the heat. The second uses graphite as a moderator but uses liquid sodium to transfer the heat.

Reactor Construction

Many technical problems are involved in the construction of these reactors, particularly due to corrosion of the reactor materials. Their main advantage over the gas cooled reactor is that they would have a slightly lower initial uranium investment and may have slightly lower capital costs. The authority expects to build a prototype of the selected reactor by 1960 and they may replace the gas cooled reactor stations in the late 1960's.

Problems of public health arising from atomic energy operations are being studied by the Medical and Health Physics Division who are also responsible for the health of Harwell's own workers. It is believed that by consistent scientific control, atomic energy can be made a very safe industry.

The nature and intensity of the radiation resulting from fallout from nuclear weapons is also being studied. It has been found that the three stage uranium-hydrogen-uranium explosions have noticeably increased radiation both in the air and on the ground. In the next 50 years, however, the total dosage of radiation from the explosions to date would only increase the radioactivity to which people were exposed by 1-500th part of the radioactivity from natural sources during the same period.

APCA Annual Meeting

THE chemical industry has experienced a seven-fold increase in sales over the past 30 years, and this growth is continuing at a phenomenal rate,' according to W. I. Burt, president of Goodrich Gulf Chemicals, Inc.

Speaking before the 49th annual meeting of the Air Pollution Control Association in Buffalo, NY, Mr. Burt described 'Management's Viewpoint of the Chemical Industry's Aid Pollution Problems.'

With the industry's expansion may come increasing problems of air pollution unless its present participation in control activities continues. In recognition of their mutual interest in reasonable and practical standards for air pollution control, the Manufacturing Chemists' Association and the Air Pollution Control Association held a technical session on 'The Chemical Industry's Approach to Air Pollution Problems.'

Other papers programmed for the session were: 'The Plant Manager's Responsibilities' by F. L. Bryant of Hooker Electrochemical Company; 'Some New Engineering Tools and Techniques for Cleaner Air' by O. C. Thompson of Carbide and Carbon Chemicals Co., Division of Union Carbide and Carbon Corp.; and 'The Chemical Industry's Assistance to Another Industry' by G. V. O'Connor of Monsanto Chemical Co.

Industrialists, scientists, educators, and government officials from all over the US and Canada gathered in Buffalo to exchange information on the latest developments in air pollution control.

Jugoslav Development

DEVELOPMENT of the heavy chemical industry in Jugoslavia is likely, and providing British manufacturers maintain a high standard of quality and deliver their goods without delay they need not fear competition. This is the opinion of Mr. Edward Gurr, managing director, Edward Gurr Ltd., London SW14, who with Mrs. Gurr recently spent some time in Jugoslavia. The fertilizer, dyestuffs, laboratory chemicals, oil and instrument industries are small as yet, but the Jugoslavs are hard working and keen to acquire knowledge, and Mr. Gurr believes that industrial expansion is likely in the future. 'As time goes on,' he says, 'Jugoslavia will offer an even richer field to British exporters'.

Coal & Chemical Engineering

An International Conference at Cheltenham

AN international conference on chemical engineering in the coal industry will be held at the National Coal Board's coal research establishment, Stoke Orchard, near Cheltenham, from 27 to 29 June. The first technical session (chairman, Dr. W. Idris Jones) will hear a paper on the controlled oxidation of coal by M. A. F. Boyer (France), and on the fluidized oxidation of coal by Dr. G. I. Jenkins (Carbonization Department, NCB coal research establishment).

For the second session the chairman will be Dr. G. Berkhoff, Netherlands. First paper, given by Dr. Ing. W. Reerink (Essen), will deal with investigations into the carbonization of briquettes in Germany. This will be followed by a paper on hot briquetting by Mr. D. H. Gregory (Briquetting Department, NCB coal research establishment).

Semi-Carbonization

On 28 June, the third session will open with 'A Study of Semi-Carbonization in a Fluid Bed' by M. Peytavy and M. P. Foch (France); then 'The Study of Tars Obtained in Fluidized Carbonization,' by Dr. G. H. Watson and Mr. A. F. Williams (By-Products Department, NCB coal research establishment). Chairman for the session will be Professor Maurice Tetort (France).

Final session, on the afternoon of 28 June, will be presided over by Professor A. R. J. P. Ubbelohde and the speaker, M. J. L. Sabatier (France), will review the industrial treatment of low-temperature carbonization tars. In the afternoon, Dr. J. Bronowski, Director, NCB coal research establishment, will sum up the technical sessions. English will be the working language of the conference.

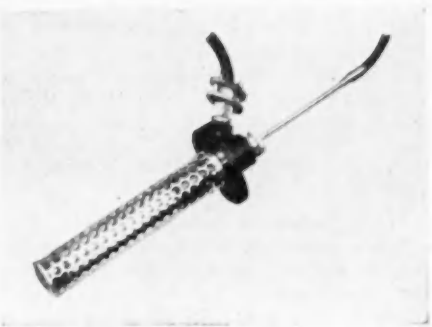
Apart from the business of the conference, there will be a number of social events. At 8.30 p.m. on 26 June, the Mayor and Corporation of Cheltenham will accord the delegates a civic reception in the Town Hall and dancing will follow. On 27 June arrangements have been made for parties to visit Stratford-upon-Avon for a performance of 'The Merchant of Venice' at the Memorial Theatre, and there will be a coach tour of the Cotswold villages for delegates' ladies on 28 June. The coal research establishment will be open to delegates and other visitors from 10 a.m. to 4 p.m. on 29 June.

Dr. Bronowski says the conference will be concerned with the great and growing importance of the development in the coal and allied industries of the modern methods of chemical engineering. He adds that in order to turn coal into better fuels, a deeper knowledge is needed of the chemistry of coal pyrolysis, and the kinetics of carbonization reactions.

Dewcel Intrinsically Safe

A CERTIFICATE of intrinsic safety has been granted to the Foxboro Dewcel, made by Foxboro-Yoxall Ltd. for dewpoint measurement, which has been modified for use in processes where flame hazards exist. The Dewcel element has now been provided with flame-proof connections, cable and transformer.

The Dewcel consists essentially of a thermometer bulb inside a thin walled metal tube covered with a woven glass tape impregnated with lithium chloride. The tube is wound with a pair of silver or gold wires over the tape and covered with a perforated metal guard. When the lithium chloride salt absorbs moisture from the surrounding atmosphere it becomes an electrical conductor so that current passes between the two wires thus raising the temperature of the Dewcel until equilibrium is reached.



The Foxboro Dewcel

• OVERSEAS •

Olin Mathieson's Future Expansion

Speaking at the annual convention of the National Federation of Financial Analysts at Boston, 23 May, Mr. John W. Hanes, chairman of the Finance Committee, Olin Mathieson Chemical Corporation, said the corporation's sales volume could climb to $1,200,000,000 in 1960, 115 per cent higher than 1955 totals, and pre-tax profits in five years could reach $229,000,000, 179 per cent higher than 1955. Drugs and pharmaceuticals would comprise 17.2 per cent of overall operations; plant foods and phosphate chemicals, 18.2 per cent; and industrial chemicals, 20.9 per cent.

Norwegian Research Fund

The fund for scientific research established by the Norwegian whaling operator and shipowner Anders Jahre now amounts to £600,000. The fund makes numerous grants to research into chemistry, medicine, law, sociology and ship technology.

Synthesis Gas Plant

Olin Mathieson Chemical Corporation's new experimental unit for the production of synthesis gas by partial oxidation of coal at Morgantown, West Virginia, would be ready to start up very shortly, M. B. Wright, manager of the company's Morgantown plant, said on 29 May. Although it would be used for experimental purposes only, the unit would be capable of producing synthesis gas in the amount required to manufacture approximately 80 tons a day of ammonia or equivalent methanol.

US Research Reactors for Germany

The US will supply two or three research reactors to West Germany within 12 months after the contract has been signed. This was announced by Herr Strauss, Minister for Atomic Affairs, on his return from the US where he had talks with Mr. Strauss, chairman of the Atomic Energy Commission. He added that no precise date for final negotiations had yet been fixed.

Norway's Trade Returns

Norwegian trade returns for the first four months this year show that for the first time metals and ores rank first among Norway's exports—earning £22,000,000 compared with £16,000,000 in the first four months last year. Norway's traditional principal export, paper and pulp, came second, earning £19,000,000 compared with £17,000,000 in the same period in 1955. The increase in metal and ore export earnings is chiefly due to bigger sales of ferro-alloys.

Record Vanadium Output

Record outputs of vanadium ore and concentrates and vanadium pentoxide, a 107 per cent increase in production of ferro-vanadium, a substantial gain in consumption of vanadium products, and a phenomenal export demand were features of the vanadium industry in 1955, according to the Bureau of Mines, United States Department of the Interior.

Less Soap Being Made

Soap production in 12 European countries which in 1954 accounted for 94 per cent of soap production and practically the whole of synthetic detergent production in OEEC member countries was lower by 1 per cent in 1955 compared with 1954, according to a report of the working party on soap and detergents of OEEC. Production of synthetic detergents was 25 per cent higher and exceeded 700,000 tons.

Acalor's Dutch Subsidiary

Acalor (1948) Ltd., specialists in anti-corrosion materials and construction, announces that it has formed a company in Holland — Acalor (Continental) NV — to manufacture and operate its European business. The address of the new company is: Kloveniersburgwal 45, Amsterdam.

US-Japanese Trading Agreement

An agreement to establish facilities for manufacturing cellulose acetate yarns and fibres in Japan has been concluded between Mitsubishi Rayon Co. Ltd., and Celatino SA, wholly-owned subsidiary of Celanese Corporation of America, it was announced recently. According to word received by Mitsubishi, the Japanese government has approved the agreement, calling for establishment of a new company with paid-up capital of 600 million yen. Celatino, with a minority interest in the company, is obligated to provide technical assistance in the form of licensing use of its processes and know-how. Initial production capacity of the new facilities is planned to be 6,000,000 lb. annually.

Publications & Announcements

KESTNER Evaporator and Engineering Co. Ltd. has, over a period of many years, developed and produced a wide range of chemical plant and allied equipment. In a special leaflet (No. 298) just published, the company explains that in the field of process heating the range of its products caters for almost every requirement using any of the basic fuels, and offers high quality control together with maximum thermal efficiency. The publication goes on to describe the Kestner heating systems available for use with general process plant. Another new leaflet (No. 286A) issued by this firm is a revision of an earlier publication dealing with general pumps. Several new photographs have been included together with up-to-the-minute information on this particular subject.

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CZECHOSLOVAKIAN standards for fine chemicals are contained in a book published by Chemapol, 9 Panska, Praha 3. These standards, of chemicals, reagents and indicators were elaborated on the basis of a precise study of foreign standards by the committee of the Czechoslovak Standard Institution. Three grades of chemicals are available; 'Guaranteed Reagent Special' which is the purist quality suitable for special scientific work. The next quality, 'Guaranteed Special' is suitable for current analyses and for industrial uses where an especially high grade of purity is required. The third grade is known as 'Pure' and corresponds to the grade formerly known as 'purissimum'. It is for use wherever it is not necessary to use chemicals of 'Guaranteed Reagent' quality. Materials in this book are listed alphabetically and detailed analytical procedures are given in each case.

* * *

DURING the period of June 1948—May 1954 the British Welding Research Association, on behalf of the Ministry of Supply, carried out a considerable research programme on the metal-arc welding of high-tensile structural steels. A report on this work, 'The Weldability of High-Tensile Structural Steels', has now been produced and is available, price £1 post free, on application to the publications department of the Association. The work described in the report includes examination of existing weldability tests, the concept of critical cooling rate and the development of the controlled thermal severity (C.T.S.) test, and the correlation between weldabiliy and end-of-transformation temperatures as determined by continuous cooling dilatation tests. The report is divided into four parts. The first two deal with the development and testing of the special steels and the second two with the mechanism of hard-zone cracking, the assessment of weldability using physical and mechanical testing schedules and the influence of hard-zone cracking on fatigue of fillet-welds.

* * *

IN AN attractive and well printed catalogue, QVF Ltd., Stone, Staffs, describe their 'Visible Flow' glass pipelines. Full details and specifications of their basic standard range of pipeline products are also given. Visible Flow pipelines and fittings ensure the conveyance of liquid and gases with safety, uncontaminated, and at a reasonable first cost, so it is claimed. The catalogue shows the assembly of these pipes, and gives details of standard fittings.

* * *

A TECHNICAL bulletin describing cellobond rubber reinforcing resins, the new BRP resin reinforcing agents for natural and nitrile rubbers, has recently been published by British Resin Products Ltd. These new reinforcing agents facilitate the use of natural and synthetic rubbers over a wide field of applications, and provide the rubber industry with a new aid in meeting the technical needs of modern industry. Cellobond rubber reinforcing resins are readily dispersible with natural and nitrile rubbers at all loadings. In nitrile rubbers particularly, and especially in harder stocks, they function both as reinforcing agents and as processing aids. These resins, which are readily available from British production reinforce hardness, according to the amounts employed, to give products ranging from soft vulcanizates to hard ebonite-like materials. They are particularly useful in the production of technical mouldings in the 90° hardness range which otherwise are produced with difficulty. Copies of the Bulletin (No. K1) can be obtained free from: Information Department, British Resin Products Limited, Devonshire House, Piccadilly, London W1.

• HOME •

Industrial Fire Protection

Annual general meeting of the Industrial Fire Protection Association will be held in London on 10 July. The Association's council have nominated the following officials for the ensuing year: *Chairman*, Mr. G. W. Power (Lobitos Oilfields Ltd.); *vice-chairman*, Mr. E. E. Chanter (Shell Refining & Marketing Ltd.); *honorary general secretary*, Mr. P. S. Cousins (The Pyrene Co. Ltd.); *honorary treasurer*, Mr. N. J. B. Robbins (The Pyrene Co. Ltd.); *chief technical officer*, Mr. E. E. Chanter; *assistant honorary general secretary and treasurer*, Mr. V. G. Mayers (Glaxo Laboratories Ltd.). The council will ask the meeting to approve an amendment to the rules allowing for the appointment of an assistant chief technical officer.

Physical Society Exhibition

The Physical Society Exhibition in 1957 will be held in both the Old and New Halls of the Royal Horticultural Society, Westminster, London SW1. The dates of this event are the 25-28 March, inclusive.

Electroplating Survey

In a survey of a cross-section of the electro-plating industry recently published by the British Non-Ferrous Metals Research Association, it is stated that sufficient care is not always taken to ensure that work is uniformly good. This applies particularly to control of deposition conditions, such as filtration, temperature of solutions, cleanliness of cathode rods and suspender hooks and time of deposition. Chemical control is usually adequate.

Antibiotic Research

The DSIR research trawler *Sir William Hardy* has returned to Aberdeen from a trip to the Faroes. The trip was made in the course of an experiment to test the efficiency of an antibiotic as a preservative for fish caught at sea.

Calder Works Symposium

There will be a symposium on the Calder Works nuclear power plant on 22 and 23 November at the premises of the Institution of Civil Engineers in London. Sponsors are the British Nuclear Energy Conference (Institutions of Civil, Mechanical, Electrical and Chemical Engineers, and the Institute of Physics). Sir John Cockcroft will preside at the sessions on 22 November, and on the following day the chairmen will be Mr. W. L. Owen for the morning session and Mr. J. Eccles for the afternoon's business. In the evening Sir John Cockcroft will again be in the chair and Sir Christopher Hinton will summarize the proceedings. Registration fee is £1 and full details may be had from the Secretary, BNEC, 1/7 Great George Street, London SW1.

English Glass Holidays

The English Glass Co. Ltd. state that their works will be closed from 4-19 August inclusive for the annual summer holiday, and from 23-26 December inclusive for the Christmas vacation.

The Warner Memorial Medal

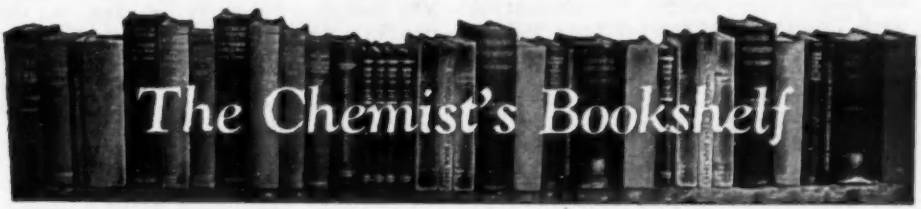
The Warner Memorial Medal, awarded by the Textile Institute in recognition of outstanding work in textile science and technology, the results of which have been published, and particularly for work published in the *Journal of the Textile Institute*, is to be conferred upon Dr. J. M. Preston, F.R.I.C., F.T.I., F.S.D.C., research manager, British Enka Ltd., Aintree.

Atom v. Death Watch Beetle

Atomic scientists in the United Kingdom are planning to use the atom to outwit the death watch beetle, which each year causes considerable damage to the woodwork of ancient buildings. Physicists at the atomic energy research establishment at Harwell, collaborating with timber experts, have found that small doses of radio-active cobalt can halt the reproductive instinct in the beetle and make its eggs infertile. The method they have developed will be used to protect historic buildings and furniture, the the principal victims of this destructive insect.

Petrie Trust Bursary

The Petrie Trust Bursary for 1956 (value, £16) has been awarded by the Pharmaceutical Society, together with a copy of the *British Pharmaceutical Codex*, to Miss Doreen M. Graham, 3 Holland Street, Aberdeen.



POLYMER PROCESSES. Edited by C. E. Schildknecht: Interscience Publishers. 1956. Pp. 914. 156s.

The volume by C. E. Schildknecht entitled 'Vinyl Resins & Their Monomers' has become a classic in the field of practical polymerization chemistry. 'Polymer Processes', which is volume X of the series on 'High Polymers', is, in the words of the preface, 'Devoted to basic processes in the polymer field, particularly with a view to bridging the gap between theory and practice'.

A group of authors, all of them having long experience in their particular field, have joined forces with Dr. Schildknecht. There are 18 different sections, of which 11 deal with various aspects of the preparation of polymers, and the remainder with specialized techniques such as compounding and processing rubbers and resins, and the spinning and drawing of fibres. There is thus a gradual transition throughout the work from the purely theoretical, as represented by the lucid introduction to Free Radical Polymerization by Dr. J. H. Baxendale, to the severely technological.

Varying Reactions of Oxygen

The chapter by Baxendale includes a simple account of the varying reactions of oxygen in polymerization, and mentions the interesting addition of sulphur dioxide to styrene and carbon monoxide to ethylene two unusual copolymerizations.

Vinyl polymerization, as would be expected, takes up more than 200 pages, much being contributed by Dr. Schildknecht himself. Perhaps more space is devoted to bulk polmerization than its industrial importance would justify, but this is used as a basis for topics such as copolymerization, and also graft copolymerization, which is introduced rather casually.

The division between suspension and emulsion polymerization is one, on the whole, to be regretted. Although the products formed are quite different, the problems of operating in the same medium are so similar that they are best discussed together, especially as the problems of initiation of polymerization are the same, not withstanding some statements in the literature to the contrary.

Some Astonishment

One must view with some astonishment the statement on p. 105 that the 'So-called vinyl acetate emulsions' have properties which generally differ from those of emulsions and latices. The fact that the particle size is higher, from 0.5-10 microns, and that they are more resistant to coagulating and freezing than other latices is simply a question of formulation, bearing in mind that these emulsions have their main outlet as media for emulsion paints. The fact that in some cases protective colloids only (such as polyvinyl alcohol) are used is by no means unique, and results from their excellent emulsifying and protective colloid properties.

In any case other industrial copolymers such as those of methyl and methacrylate and an alkali methacrylate can fulfil the same purpose.

Most of this material, which is included under Dispersion Polymerization, should be in the section on Polymerization in Emulsion (H. Leverne Williams). This latter contains much familiar matter, but also includes several interesting pages on polymerization equipment. The inevitable examples of butadiene copolymers are quoted.

'Polymerizations in Solution' includes those in aqueous medium, such as the water soluble methacrylates, and also precipitation polymerization, as represented by aqueous acrylonitrile, although the redox system illustrated really belongs to emulsion polymerization.

Ionic polymerization is however a much less familiar one and Dr. Schildknecht extends this from the familiar types such as polyisobutylene to the less familiar reactions such as the polymerization of diazomethane by BF_3 etc., to give polymethylene.

Two chapters deal with the chemistry of polyamides and polyesters, and with condensation products of formaldehyde. The former gives the chemistry which leads to the production of nylon and Terylene, while the latter includes a number of useful practical examples.

Further sections on the preparation of polymers cover the Epoxy resins, cellulose and its derivatives and the polysulphide Thiokol types, which latter have been rather ignored in this country.

The study of adhesives is still largely empirical, but the chapter by W. J. Powers summarizes such information as is known, e.g. the influence of hydroxy or carboxyl groups under specific conditions, together with some practical applications and tests. Familiar applications such as those of the methacrylates and epoxy compounds are included together with some more unusual chelate compounds.

Stabilization of polymers is rather an 'umbrella' term, covering protection against the breakdown of chlorine containing polymers, that of cellulose derivatives by micro-organizms or sunlight, as well as degradation of synthetic rubbers and polyesters. The chemistry of the breakdown of chlorine—containing polymers is dealt with in a reasonably complete manner. Further work on this subject has been completed recently by Dr. Grassie.

Specialized Interest

Some of the final sections of the book e.g., paste techniques, compounding and processing are of specialized interest to the technician. Latex techniques, however, includes some recent theory on film formation together with a short summary of latex paints, including polyvinyl acetate. Polymer Reinforcement includes the chemistry of polyesters.

The final chapter, which describes some of the techniques of spinning and drawing fibres, includes recent work on acrylic fibres and polyvinyl alcohol, in addition to the cellulose fibres, and the polyamide (nylon) type.

It is easy to criticize a volume of this type, which covers so wide a field. Nevertheless it is useful as a standby for the specialist, and should prove easily readable to the chemist who wishes for a general review without excessive intricate details. The faults of the book are a certain amount of repetition, and a tendency to quote little work outside the US.—H.W.

GAS CHROMATOGRAPHY. By Courtenay Phillips. Butterworth Scientific Publications, London. 1956. Pp. x + 105. 25s.

Rapidly-expanding interest is being shown in the methods of gas chromatography for research in universities as well as for research and routine analysis in industry. Publication of this monograph is, therefore, timely. The author has made important contributions to the field and is well qualified for his task.

Gas Chromatography

In addition to descriptions of the various types of gas chromatography, i.e. gas-liquid partition, elution analysis and displacement analysis with gas-adsorption chromatography, a good account is given of the theoretical principles underlying the methods. A couple of chapters are devoted to experimental methods in which most of the important developments in technique are described in fair detail. The illustrations are numerous and of good quality and, taken as a whole, the monograph represents a well-balanced and interesting account of the subject.

It will give an excellent idea of the scope of the methods to those, as yet unfamiliar, with the advantages to be gained from the employment of these new techniques. It is perhaps unfortunate, from the point of view of those who are about to use gas chromatography themselves, that so much space is wasted by the extensive divisions of the chapters into sections. There are no less than 51 sections in the 93 pages of text as well as a number of sub-headings. Space occupied by some of these headings could have been better employed for more detailed description of apparatus, or more discussion of methods and results.

Style is clear and readable, although a statement at the top of p. 17 ('as the pressure drops across the column approaches unity') is misleading. Another small point is that if it is considered of value to include the Greek word from which katharometer

is derived (p. 39), it is important that the Greek should not be garbled. Price of the book seems high for its size although, no doubt, a substantial part of the cost is caused by the number of figures.—C. KEMBALL.

TREATISE ON INORGANIC CHEMISTRY. Vol 1. By H. Remy. Translated by J. Anderson. Edited by J. Kleinberg. Elsevier Publishing Company, Amsterdam; Cleaver-Hume Press Ltd., London. 1956. Pp. xxi + 866. 105s.

When reviewing the translation of a standard work it is debatable whether one regards the work of the original author or the work of the translator as being the more important of the matters for discussion. Here an editor as well as a translator is involved, and there is little indication as to how far his responsibilities have extended.

Remy's book has for many years been a standard work on the Continent, and this translation is based on the seventh and eighth German editions. British inorganic chemists, already thoroughly familiar with the original, will undoubtedly be grateful that it is now more easy of consultation in an English text—or perhaps one should say in an American text, since American spelling, sign conventions and the like have been adopted.

Translation Difficulties

It should first be said that Professor Anderson has done his share of the job ably. To translate from the German and to retain no flavour of the original language is a difficult task, as all too many translations bear witness. Wherever one opens this book it is possible to read without finding any indication that the book is anything other than an original text. This in itself is an achievement of note.

Difficulty has arisen, however, over such matters as nomenclature, which presumably were the concern of the editor. Thus, there is confusion among the terms 'nitrosonium', 'nitrosyl', 'nitronium' and 'nitryl' ions. The name 'oxygen difluoride' is used but other analogous compounds are named as oxides of the respective halogens. 'Selenious acid' is used, but 'tellurous acid'. There has also been difficulty with names of authors beginning with a particle. For example, we find both Van't Hoff and van't Hoff, de Boer and De Boer. And in indexing, these named are indexed according to the particle, and not as they should be (and are in the German original) according to the first capital letter when correctly printed.

The most serious criticisms arise when one considers the actual content of the book. In the preface there is the suggestion that the first edition (in 1931) originated the method of treating the elements strictly according to the Periodic Law. This may be true of German books, but at least one English text did this as long ago as 1906. However, the treatment here is still (as was more usual in 1930) according to the short form of the Periodic Classification. This, as well as other points, suggest that successive editions have been produced too much by accretion, with insufficient regard to wholesale revision of approach. Thus, the reader would get the impression that the Lewis and Kossell theories of atomic structure are at least as important as the wave-mechanical treatment.

List of References

Each chapter is followed by a list of references confined almost solely to books and monographs, many of which seem to have been perpetuated quite uncritically from the first edition since they refer to books published 30 or 40 years ago. There is also a bibliography at the end of the volume entitled 'Suggestions for Further Reading.' Even the most conscientious student's heart might fail when he finds that two (out of 45) of the works offered (without selective guidance) for his general reading are 'Handbook of Chemistry and Physics', and 'Thorpe's Dictionary of Applied Chemistry'.

There are some curious omissions from the book also, notably the Lewis conception of acids and bases, and, in the section on determination of hydrogen ion concentration, the glass electrode and the quinhydrone electrode. There is no mention of either electron diffraction or neutron diffraction in the section on the determination of structure.

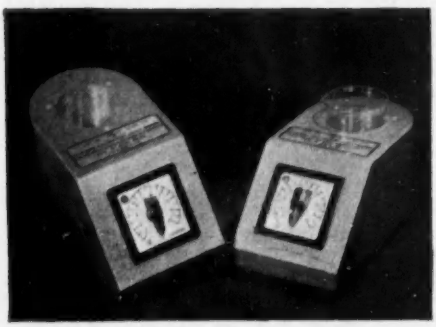
No work of this monumental size could possibly be without flaws, and if the reviewer has been critically severe, it is because the work is worth being critical about. It should undoubtedly be placed on chemical library shelves, where it will find extensive use. Its price puts it out of the reach of the average student. Its weight (3 lb. 9 oz.) will prevent it from becoming popular for casual reading.—CECIL L. WILSON.

Stabilag Jackets

EXPERIMENTS which began nearly two years ago have resulted in the production of the Stabilag Jacket, made by The Stabilag Co. Ltd., a flexible heating surface which is claimed to achieve the uniformity of a water or oil jacket heater.

Stabilag jacketing is constructed from fibre glass cloth to which is stitched a closely pitched resistance wire. The pitch of the wire is so close that there is virtually no gradient between each turn. The element lies between two further layers of glass cloth. Each jacket is tailored and moulded for its particular purpose, and is normally supplied with an aluminium outer cover.

Several types of control gear are supplied, according to the degree of accuracy required.



Stabilag jackets with switches

These jacketings are designed to bring liquids smoothly to the boil without any bumping. If an empty vessel is left in the switched on jacket the element temperature will not rise above 550°C, which is the highest temperature glass cloth will comfortably withstand.

German Congress and Exhibition

At the time of going to press, we learned that over 10,000 specialists and experts from Germany and abroad had visited the 12th Chemical Apparatus and Equipment Congress and Exhibition which was held in Frankfurt am Main from 31 May to 8 June. For the first time in the history of this event, which was organized by DECHEMA, Deutsche Gesellschaft fur Chemisches Apparatewesen, nuclear physics and technology formed a separate group. This was to facilitate the exchange of ideas in the field of applied nuclear physics.

Next Week's Events

MONDAY 18 JUNE

Plant Protection Ltd.

London: Dorchester Hotel, 12.15 p.m. Inaugural luncheon for the second International Plant Protection Conference.

TUESDAY 19 JUNE

Plant Protection Ltd.

Haslemere: Fernhurst Research Station. Second International Plant Protection Conference. For details of programme see THE CHEMICAL AGE, 26 May, p. 1173.

WEDNESDAY 20 JUNE

Plant Protection Ltd.

Haslemere: Fernhurst Research Station. Second International Plant Protection Conference.

Polarographic Society

London: Chemistry Lecture Theatre, Battersea Polytechnic, Battersea Park Road SW11. Two-day symposium, 'Polarography and Medicine.' 10 a.m. to 4 p.m. 'General Applications of the Polarograph in Medicine'.

British Association of Chemists

London: Savoy Hotel, Strand WC2, 7.15 p.m. 'Industrial Chemistry in the Service of Medicine' by J. E. McKeen, LL.D., D.Eng., B.Sc.Chem.Eng.

THURSDAY 21 JUNE

Plant Protection Ltd.

Haslemere: Fernhurst Research Station. Second International Plant Protection Conference.

Polarographic Society

London: Chemistry Lecture Theatre, Battersea Polytechnic, Battersea Park Road SW11. Two-day symposium, 'Polarography and Medicine', 10 a.m. to 4 p.m. 'Applications of the Polarograph in Cancer Diagnosis & Treatment'.

SCI (Microbiology Group)

East Malling: East Malling Research Station, Maidstone, Kent, 11.30 a.m. Visit.

British Acetylene Association

London: Connaught Rooms, Great Queen Street WC2, 12 noon. Annual general meeting and luncheon.

British Association Meeting

Annual meeting of the British Association for the Advancement of Science takes place in Sheffield from 29 August to 5 September. Many of the section meetings will be held in the University.

Microvolumetric Meeting

Three Papers Presented at Bradford

THREE papers were presented at a joint meeting of the Microchemistry Group and the North of England Section of the Society for Analytical Chemistry, held on 25 May at Bradford Technical College.

The subject of the meeting was 'Microvolumetric Analysis', and the first paper, 'Apparatus and Technique' by D. W. Wilson of Sir John Cass College, London, described some types of apparatus for the delivery and titration of small volumes of liquids. Their manipulation, accuracy, and the kinds of error to which they were subject were discussed.

Dr. R. Belcher of the University of Birmingham spoke on 'Primary Standards'. He discussed the necessary requirements f primary standards for use in microanalysis and made some new observations concerning the old established standards, with special reference to those used in standardizing for complete determinations in organic microanalysis. A brief survey was also given by Dr. Belcher of some new primary standards which appeared to be of promise both in organic and inorganic microanalysis.

'End Point Location' was discussed by E. Bishop of the University of Exeter. He enumerated the methods of locating the end point of a titrimetric process: the use of principal and ancillary reagents (colour, adsorption, fluorescent and precipitation indicators) observed visually or photoelectrically; electrical methods such as potentiometry, amperometry and low and high frequency conductometry; and other miscellaneous techniques based on the properties of electrode systems.

Obituary

MR. THOMAS HENRY HEWLET (74), MP for Manchester (Exchange) from 1940 to 1945, has died in a Sale nursing home. Mr. Hewlet was chairman of the Anchor Chemical Co., Joseph Anderson & Sons, rubber reclaimers, and the United Oil & Natural Gas Products Corporation.

MR. SYDNEY SHAW, a director of Bradford Dyers' Association Ltd., died on 1 June at the age of 62. Educated at Bradford Grammar School and Cambridge, he entered the BDA in 1919. He became a director of the Greetland Dyeing Co. Ltd. in 1936, and joined the board of the BDA in 1948.

Sales Services

A REALIGNMENT of sales management responsibilities to provide better service to customers under conditions of expanding sales has been announced by the Industrial Chemicals Division of Olin Mathieson Chemicals Corporation. Kenneth C. Frazier has been appointed manager of the general products sales department with responsibility for departmental sales planning, exclusive of field sales. The latter will be handled separately under the direction of Derek Richardson as manager and O. J. Theobald, Jr., assistant manager. Both organic and inorganic products will be handled through these groups. A sales development department controlling technical services, market development and market research, has been established with Laurence A. Russell as manager. All divisional activities pertaining to accounting, treasury, budgets and financial analysis have been centralized in an administrative services department under the managership of Cecil L. Williamson. The appointments were announced by John O. Logan, vice-president and general manager of the division.

Power-Gas Review

THE first issue of *The Power-Gas Group Review* has been published by the Power-Gas Corporation Ltd. It is intended to keep the corporation's friends and clients informed of the affairs of the group. This issue contains an article on 'The Sulphuric Acid Industry' by B. A. Pragnell, an article on 'Gasholder Reconstruction' by J. A. Walton, describing the reconstruction of the No. 2 gasholder at Bradford Road Gas Works, Manchester, commercial news, and details of Power-Gas Group publications.

Control of Air Pollution

The US nation's two top awards in connection with control of air pollution were conferred upon MR. WARD F. DAVIDSON of Port Washington, New York, and DR. EDWARD R. WEILDEIN of Pittsburgh, Pa., by the Air Pollution Control Association on 22 May at Hotel Statler, Buffalo, NY. The awards were a highlight of the Association's 49th international meeting, presided over by MR. H. KENNETH KUGEL, 20-24 May, which was attended by 700-800 people from all parts of the US and Canada.

Chemistry Research in 1955

Fewer Topics to be Studied

THE present programme of research at the Chemical Research Laboratory covers such a wide variety of subjects in relation to the staff available that effort is to be concentrated on a number of selected topics only, says the report of the Chemistry Research Board for 1955 (*Chemistry Research 1955*, published by HMSO for DSIR, price 4s, by post 4s 3½d). There is a tendency, says the report, for outside organizations to call upon the laboratory for testing services in connection with subjects and techniques that have ceased to be of research interest. Steps are being taken to ensure that this type of work is done by consultants and not by the laboratory.

Direct Link

The report emphasizes the direct link between the laboratory and the mines engaged in the extraction and concentration of metals which are valuable for atomic energy. Results of research work carried out on behalf of the UK Atomic Energy Authority are being applied in countries of the Commonwealth, and a representative of the laboratory has been stationed in South Africa for a considerable period in order to examine processes in working conditions.

Nearly one-fourth of the scientific staff of the laboratory is engaged on work for the UK Atomic Energy Authority. The main researches are concerned with evaluation and treatment of minerals, ores and other materials containing valuable metals, by the improvement and development of new techniques for analysis, and by study of methods of extraction and concentration of the metals present.

A new process for the recovery of gold from cyanide solutions has been developed which promises to bring about a major change in gold recovery technique. The essence of the new discovery is that gold and silver can be selectively adsorbed from a normal gold mill pregnant liquor by certain weak base ion-exhange resins, and can then be easily eluted by an aqueous solution of a relatively inexpensive reagent, such as ammonium thiocyanate. Recovery of gold from the thiocyanate solution is readily achieved by electrolysis at a low e.m.f.

The process has the double advantage over the previous ion-exchange procedure in that the use of organic solvents for the elution of gold can be avoided and since gold and silver are preferentially adsorbed on the resin, reagents are not required for eluting large quantities of unwanted metals in the liquors. The gold producing industry is showing great interest in the new process.

The programme on the rare earths has attracted considerable interest and the Atomic Energy Authority, in particular, has requested supplies of a number of the pure earths. The laboratory is engaged in a study of methods of separating the rare earths and of producing pure compounds and, ultimately, the pure metals. Ion-exchange methods are being employed and an apparatus constructed capable of handling kilogram quantities of the mixed earths.

One of the more important developments in chromatographic techniques made during the year has been the discovery that the technique of paper chromatography can be extended into new fields by the use of cellulose in which the OH groups attached to the glucose residues are chemically combined with acidic or basic groups. Phosphorylated cellulose can adsorb large quantities of certain metals from very highly acid solutions when normal ion-exchange resins would be ineffective.

Strip Chromatography

The cellulose material can be used in the form of paper for strip chromatography or in the form of a floc for use in columns. A tendency for the material to deteriorate in storage has been overcome, resulting in a product sufficiently stable for practical purposes.

A simple method has been devised for preparing paper with ion-exchange properties in which a finely divided ion-exchange resin is incorporated in the cellulose pulp. The ion-exchange paper prepared from the pulp should be of value in qualitative analysis and can be used for the separation of mixtures of cations (or anions) using techniques similar to those employed in conventional paper chromatography.

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

ALLEN & HANBURYS LTD., London, E. chemists etc.—10 May, deb., to Erlangers Ltd. securing all moneys due or to become due from the company to the holders; general charge (subject to etc.). *£939,549. 2 January 1956.

ENGLAND HUGHES BELL & CO. LTD., Eccles, chemical manufacturers.—10 May, mort., to Westminster Bank Ltd. securing all moneys due or to become due to the bank; charged on premises known as Valley Works, Monton Road and 5 and 6 Stanley Avenue, Eccles, with fixed plant and machinery and a general charge. *£8,000. 25 May 1955.

VICTOR WOLF LTD. Manchester, acid manufacturers etc.—9 May, £20,000 mort., to Eagle Star Insurance Co. Ltd.; charged on freehold Victoria Works, and leasehold property now or formerly called Victoria Mill and Clayton Mill, Croft Street, Clayton, Manchester. *£26,962. 13 July 1955.

Satisfaction

SCIENTIFIC INSTRUMENT & MODEL CO. LTD. Ross-on-Wye.—Satisfaction 15 May, of deb. registered 22 January 1953.

Increases of Capital

J. M. & W. DARLING LTD., manufacturing chemists, 1 Stanhope Road East, South Shields, increased by £2,000 in £1 ordinary shares, beyond the registered capital of £3,000.

G. S. TRADING CO. LTD., manufacturers of branded chemicals, man-made fibres, plastics etc., 11a Southgate Street, Winchester, increased by £100, in £1 non-voting ordinary shares, beyond the registered capital of £100.

ALLIANCE (MANCHESTER) LTD., Third Avenue, Trafford Park, Manchester, increased by £10,000 in £1 ordinary shares, beyond the registered capital of £5,000.

Company News

Laporte Industries Ltd.

Consolidated group profit of Laporte Industries Ltd. for the year ended 31 March 1956 amounted to £1,687,655 (last year it was £1,504,263). A final dividend of 11 per cent on the increased capital is recommended, an interim dividend of 5 per cent having been paid on £2,434,423 issued ordinary stock prior to the issue of £811,474 ordinary stock during the year under review.

Stevenson & Howell

Group trading profit of Stevenson & Howell (manufacturing chemists) for 1955 was £167,770 (£139,064), and ordinary dividend 20 per cent (17). Current assets total £604,399 (£556,823) and liabilities £119,790 (£115,818). Revenue reserves stand at £284,120 (£253,865). Meeting, Southwark Street, London SE1, 28 June, 11 a.m.

William Tatton & Co.

Net earnings of William Tatton & Co. Ltd. (dyers, throwsters and processors of silk, rayon, nylon and Terylene yarns) for the year ended 31 December 1955 amounted to £291,880, an increase over 1954 of £20,060. After tax deductions, the net profit was £136,189, an improvement of £13,467. Directors recommend a final dividend of 10 per cent which, with the interim dividend of 5 per cent, makes a total of 15 per cent (same).

Shawinigan Water & Power Co.

Revenue from power sales in the three months ended 31 March 1956 amounted to $13,308,994, an increase of 15 per cent over the first three months of 1955. Total revenue amounted to $14,006,348 compared with $12,266,252 for the same period of 1955.

Albright & Wilson Ltd.

Speaking at the 64th annual general meeting of Albright & Wilson Ltd., Mr. Kenneth H. Wilson (chairman) stated that the final results for the year ended 31 December

1955 confirmed earlier expectations, in that turnover continued to rise but the profit margins tended to decline. This was mainly due to rising costs in the United Kingdom and the loss incurred by one of the subsidiaries which resulted from technical difficulties. Trading profit for 1955, at £3,200,000, thus showed only a small increase over the 1954 figure of £3,134,000. Net profit was almost unchanged, at £859,000, compared with £860,000 for the preceding year. A final dividend of 18 per cent was confirmed.

A. Boake Roberts & Co. (Holding)

A 2½ per cent bonus is being added to an unchanged 11 per cent final dividend recommendation by A. Boake Roberts & Co. (Holding) for the year to 31 March 1956. This makes a total of 17½ per cent against 15 per cent on the £475,000 ordinary stock. Group profits, which in the previous year showed a further big recovery from the 1952-53 setback, have again increased, amounting to £504,815, compared with £425,048, before tax. After the higher UK tax provision the balance of profits attributable to the company is up from £200,250 to £252,866. Meeting to be held on 18 July.

75th Anniversary

CAMBRIDGE Instrument Co. Ltd. is celebrating the 75th anniversary of its foundation. To commemorate the occasion, the firm has published a beautifully produced brochure which relates details of its uninterrupted progress from small beginnings to the worldwide organization that exists today. The brochure mentions some of the eminent scientists and industrialists with whom Cambridge Instruments has co-operated during this 75-year period. Reference is also made to certain noteworthy fundamental instruments developed and manufactured by the company.

Petrocarbon's Services

PETROCARBON Developments Ltd. have recently published an illustrated brochure outlining the company's comprehensive engineering and consultancy service to the chemical and petroleum industries. Also shown are examples of Petrocarbon designed, engineered and erected plants. Copies of the publication can be obtained from Petrocarbon's London office at 17 Stratton Street, W.1.

Market Reports

LONDON.—Firm prices have been maintained in most sections of the market with home and export demand fairly active. There has been little change during the week in the position of the soda products and the potash chemicals, and contract deliveries are being taken up in good quantities. A seasonal falling off in the demand for the fertilizer materials has been reported but in other directions there has been a good call for such items as hydrogen peroxide, acetone, formaldehyde and the citric and tartaric acids. Paint raw materials are in good demand and the quotations for the lead compounds were raised on 7 June to £145 15s per ton for white lead and £140 10s per ton for red lead. The demand for pitch is perhaps quieter, but a ready outlet continues for the majority of the coal-tar products with cresylic acid in strong request.

MANCHESTER.—With a few exceptions mainly in the metal compounds, values on the Manchester chemical market remain on a firm basis and while costs continue their upward trend traders see little prospect of any reaction. Contract deliveries to industrial consumers in the Lancashire area are mostly on a satisfactory scale and replacement buying is going on steadily as the need arises. A fair number of enquiries on overseas a/cs continues in circulation. Apart from one or two sections, business in fertilizers is at a seasonally low level. The light and heavy tar products are meeting with a steady demand.

GLASGOW.—A rather busy week's trading characterized the Scottish heavy chemical market which has covered a fairly wide range of chemicals. There has been continued activity on the agricultural side and again the demand has been good. On the whole prices have remained fairly steady.

New Offices

Chemicals & Feeds Ltd., announce that from 16 June their offices will be at Adelaide House, King William Street, London EC4 (MANsion House 9631). The move has been made to centralize and accommodate the increased staff required for the widening activities of the company. Recently Mr. J. K. Marsden joined Chemicals & Feeds Ltd. to take control of the section handling oil cakes, meals and kindred products.

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	Page
A.P.V. Co., Ltd. (The)	1308
Borax Consolidated Ltd.	Front Cover
British Carbo Norit Union Ltd.	1300
Brough, E. A., & Co., Ltd.	1303
Calder Vale Glassworks Ltd.	1344
Classified Advertisements	1342, 1343 & 1344
Clydesdale Chemical Co., Ltd.	1304
Collins Improved Firebars Ltd.	1346
Cromil & Piercy Ltd.	Cover ii
Kestner Evaporator & Engineering Co., Ltd.	1344
Key Engineering Co., Ltd. (The)	Cover ii
Lennox Foundry Co., Ltd.	1300
Lord, John L., & Son	Cover iv
Metropolitan-Vickers Electrical Co., Ltd.	Cover iv
Mond Nickel Co., Ltd. (The)	1301
Moritz Chemical Engineering Co., Ltd.	1302
National Enamels Ltd.	1302
Nu-Swift Ltd.	1344
Q.V.F., Ltd.	1299
Shell Chemical Co., Ltd.	1306
Siebe Gorman & Co., Ltd.	Cover iii
Steel, J. M., & Co., Ltd.	1341
United Coke & Chemicals Co., Ltd.	Cover iii
Vitax Ltd.	1302
Wells, A. C., & Co., Ltd.	Cover ii
Wilkinson Rubber Linatex Ltd.	1345
Worcester Royal Porcelain Co., Ltd. (The)	1346
Wynn Valves Limited	1305
Zeal, G. H., Ltd.	1304

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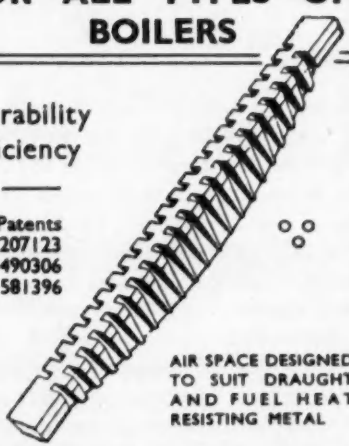

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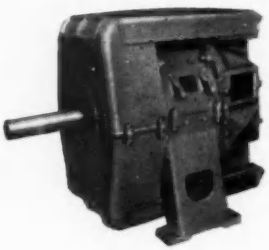

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